10/564276

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Liquid-crystalline medium

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Liquid-crystalline medium

The present invention relates to a liquid-crystalline medium, to the use thereof for electro-optical purposes, and to electro-optical display devices which contain this medium.

Liquid crystals are used principally as dielectrics in display devices, since the optical properties of such substances can be modified by an applied voltage. Electro-optical devices based on liquid crystals are extremely well known to the person skilled in the art and can be based on various effects. Examples of such devices are cells having dynamic scattering, DAP (deformation of aligned phases) cells, guest/host cells, TN cells having a twisted nematic structure, STN (supertwisted nematic) cells, SBE (super-birefringence effect) cells and OMI (optical mode interference) cells. The commonest display devices are based on the Schadt-Helfrich effect and have a twisted nematic structure.

The liquid-crystal materials must have good chemical and thermal stability and good stability to electric fields and electromagnetic radiation. Furthermore, the liquid-crystal materials should have low viscosity and produce short addressing times, low threshold voltages and high contrast in the cells.

They should furthermore have a suitable mesophase, for example a nematic or cholesteric mesophase for the above-mentioned cells, at the usual operating temperatures, i.e. in the broadest possible range above and below room temperature. Since liquid crystals are generally used as mixtures of a plurality of components, it is important that the components are readily miscible with one another. Further properties, such as the electrical conductivity, the dielectric anisotropy and the optical anisotropy, have to satisfy various requirements depending on the cell type and area of application. For example, materials for cells having a twisted nematic structure should have positive dielectric anisotropy and low electrical conductivity.

For example, for matrix liquid-crystal displays with integrated non-linear elements for switching individual pixels (MLC displays), media having large positive dielectric anisotropy, broad nematic phases, relatively low birefringence, very high specific resistance, good UV and temperature stability and low vapour pressure are desired.

Matrix liquid-crystal displays of this type are known. Non-linear elements which can be used for individual switching of the individual pixels are, for example, active elements (i.e. transistors). The term "active matrix" is then used, where a distinction is made between two types:

1. MOS (metal oxide semiconductor) or other diodes on a silicon wafer as substrate.

2. Thin-film transistors (TFTs) on a glass plate as substrate.

The use of single-crystal silicon as substrate material restricts the display size, since even modular assembly of various part-displays results in problems at the joints.

In the case of the more promising type 2, which is preferred, the electro-optical effect used is usually the TN effect. A distinction is made between two technologies: TFTs comprising compound semiconductors, such as, for example, CdSe, or TFTs based on polycrystalline or amorphous silicon. Intensive work is being carried out worldwide on the latter technology.

The TFT matrix is applied to the inside of one glass plate of the display, while the other glass plate carries the transparent counterelectrode on its inside. Compared with the size of the pixel electrode, the TFT is very small and has virtually no adverse effect on the image. This technology can also be extended to fully colour-capable displays, in which a mosaic of red, green and blue filters is arranged in such a way that a filter element is opposite each switchable pixel.

The TFT displays usually operate as TN cells with crossed polarisers in transmission and are back-lit.

The term MLC displays here covers any matrix display with integrated non-linear elements, i.e., besides the active matrix, also displays with passive elements, such as varistors or diodes (MIM = metal-insulator-metal).

MLC displays of this type are particularly suitable for TV applications (for example pocket TVs) and for high-information displays for computer applications (for example laptops) and in automobile and aircraft construction. Besides problems regarding the angle dependence of the contrast and the response times, difficulties also arise in MLC displays due to insufficiently high specific resistance of the liquid-crystal mixtures [TOGASHI, S., SEKIGUCHI, K., TANABE, H., YAMAMOTO, E., SORIMACHI, K., TAJIMA, E., WATANABE, H., SHIMIZU, H., Proc. Eurodisplay 84, Sept. 1984: A 210-288 Matrix LCD Controlled by Double Stage Diode Rings, p. 141 ff, Paris; STROMER, M., Proc. Eurodisplay 84, Sept. 1984: Design of Thin Film Transistors for Matrix Addressing of Television Liquid Crystal Displays, p. 145 ff, Paris]. With decreasing resistance, the contrast of an MLC display deteriorates, and the problem of after-image elimination may occur. Since the specific resistance of the liquid-crystal mixture generally drops over the life of an MLC display owing to interaction with the interior surfaces of the display, a high (initial) resistance is very important in order to achieve acceptable service lives. In particular in the case of low-volt mixtures, it was hitherto impossible to achieve very high specific resistance values. It is furthermore important that the specific resistance exhibits the smallest possible increase with increasing temperature and after heating and/or UV exposure. The low-temperature properties of the mixtures from the prior art are also particularly disadvantageous. It is demanded that no crystallisation and/or smectic phases occur, even at low temperatures, and the temperature dependence of the viscosity is as low as possible. The known MLC displays do not meet these requirements.

There thus continues to be a great demand for MLC displays having very high specific resistance at the same time as a large working-temperature range, short response times even at low temperatures and low threshold voltage which do not have the said disadvantages, or only do so to a reduced extent.

In addition to liquid-crystal displays which use backlighting, i.e. are operated transmissively and if desired transflectively, reflective liquid-crystal displays are also particularly interesting. These reflective liquid-crystal displays use the ambient light for information display. They thus consume significantly less energy than back-lit liquid-crystal displays having a corresponding size and resolution. Since the TN effect is characterised by very good contrast, reflective displays of this type can even be read well in bright ambient conditions. This is already known of simple reflective TN displays, as used, for example, in watches and pocket calculators. However, the principle can also be applied to high-quality, higher-resolution active matrix-addressed displays, such as, for example, TFT displays. Here, as already in the transmissive TFT-TN displays which are generally conventional, the use of liquid crystals of low birefringence (Δn) is necessary in order to achieve low optical retardation ($d \cdot \Delta n$). This low optical retardation results in usually acceptable low viewing-angle dependence of the contrast (cf. German Patent 30 22 818). In reflective displays, the use of liquid crystals of low birefringence is even more important than in transmissive displays since the effective layer thickness through which the light passes is approximately twice as large in reflective displays as in transmissive displays having the same layer thickness.

The advantages of reflective displays over transmissive displays, besides the lower power consumption (since backlighting is unnecessary), are the space saving, which results in a very small physical depth, and the reduction in problems due to temperature gradients caused by different degrees of heating by the backlighting.

In TN (Schadt-Helfrich) cells, media are desired which facilitate the following advantages in the cells:

- extended nematic phase range (in particular at low temperatures),

- the ability to switch at extremely low temperatures (outdoor use, automobiles, avionics),

- elevated resistance against UV radiation (longer life),
- low rotational viscosities,
- low threshold (addressing) voltage and
- high birefringence for thinner layer thicknesses and thus shorter response times.

The media available from the prior art do not allow these advantages to be achieved while simultaneously retaining the other parameters.

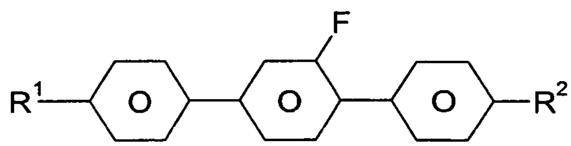
In the case of supertwisted (STN) cells, media are desired which enable greater multiplexability and/or lower threshold voltages and/or broader nematic phase ranges (in particular at low temperatures). To this end, a further widening of the available parameter latitude (clearing point, smectic-nematic transition or melting point, viscosity, dielectric parameters, elastic parameters) is urgently desired.

In addition, the trend in monitor and TV applications is towards ever-shorter response times. The display manufacturers are reducing the response time through the use of displays of smaller layer thickness. At constant optical path length $d \cdot \Delta n$, this requires liquid-crystal mixtures of greater Δn. In addition, the use of liquid-crystal mixtures of low rotational viscosity likewise results in a shortening of the response times.

The present invention thus had the object of providing media for MLC, TN or STN displays of this type, preferably for MLC and TN displays and particularly preferably for transmissive TN displays, which do not have the above-mentioned disadvantages or only do so to a reduced extent, and at the same time preferably have very low rotational viscosities γ_1 and relatively high optical anisotropy values Δn. The mixtures according to the invention should preferably find use in transmissive applications.

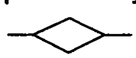
It has now been found that these objects can be achieved if the media according to the invention are used in displays.

The present invention thus relates to a liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy which is characterised in that it comprises one or more compounds of the general formula I



I

in which

R^1 and R^2 are each, independently of one another, identically or differently, H, an alkyl radical having from 1 to 12 carbon atoms which is unsubstituted, monosubstituted by CN or CF_3 or at least monosubstituted by halogen, where, in addition, one or more CH_2 groups in these radicals may each, independently of one another, be replaced by -O-, -S-,  , -CH=CH-, -C≡C-, -CO-, -CO-O-, -O-CO- or -O-CO-O- in such a way that O atoms are not linked directly to one another.

The compounds of the formula I have a broad range of applications. These compounds can either serve as base materials of which liquid-crystalline media are predominantly composed, or they can be added to liquid-crystalline base materials from other classes of compound in order, for example, to modify the dielectric and/or optical anisotropy of a dielectric of this type and/or to optimise its threshold voltage and/or its viscosity.

In the pure state, the compounds of the formula I are colourless and form liquid-crystalline mesophases in a temperature range which is favourably located for electro-optical use. They are stable chemically, thermally and to light.

If R^1 and/or R^2 are an alkyl radical, this may be straight-chain or branched. It is preferably straight-chain, has 1, 2, 3, 4, 5, 6, 7, 8 or 9 carbon atoms and accordingly is preferably methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl or nonyl, furthermore decyl, undecyl or dodecyl. Groups having from 1 to 5 carbon atoms are particularly preferred.

If R^1 and/or R^2 are an alkoxy radical, this may be straight-chain or branched. It is preferably straight-chain, has 1, 2, 3, 4, 5, 6, 7, 8 or 9 carbon atoms and accordingly is preferably methoxy, ethoxy, propoxy, butoxy, pentoxy, hexoxy, heptoxy, octoxy or nonoxy, furthermore decoxy or undecoxy.

If R^1 and/or R^2 are an oxaalkyl radical, this may be straight-chain or branched. It is preferably straight-chain, has 1, 2, 3, 4, 5, 6, 7, 8 or 9 carbon atoms and accordingly is preferably 2-oxapropyl (= methoxymethyl), 2- (= ethoxymethyl) or 3-oxabutyl (= 2-methoxyethyl), 2-, 3- or 4-oxapentyl, 2-, 3-, 4- or 5-oxahexyl, 2-, 3-, 4-, 5- or 6-oxaheptyl, 2-, 3-, 4-, 5-, 6- or 7-oxaoctyl, 2-, 3-, 4-, 5-, 6-, 7- or 8-oxanonyl or 2-, 3-, 4-, 5-, 6-, 7-, 8- or 9-oxadecyl.

If R^1 and/or R^2 are an alkyl radical in which one CH_2 group has been replaced by -CH=CH-, this may be straight-chain or branched. It is preferably straight-chain and has from 2 to 10 carbon atoms. Accordingly, it is particularly preferably vinyl, prop-1- or -2-enyl, but-1-, -2- or -3-enyl, pent-1-, -2-, -3- or -4-enyl, hex-1-, -2-, -3-, -4- or -5-enyl, hept-1-, -2-, -3-, -4-, -5- or -6-enyl, oct-1-, -2-, -3-, -4-, -5-, -6- or -7-enyl, non-1-, -2-, -3-, -4-, -5-, -6-, -7- or -8-enyl, or dec-1-, -2-, -3-, -4-, -5-, -6-, -7-, -8- or -9-enyl.

If R^1 and/or R^2 are an alkyl radical in which one CH_2 group has been replaced by -O- and one has been replaced by -CO-, these are preferably adjacent. These thus contain an acyloxy group -CO-O- or an oxycarbonyl group -O-CO-. These are preferably straight-chain and have from 2 to 6 carbon atoms. Accordingly, they are particularly preferably acetoxy, propionyloxy, butyryloxy, pentanoyloxy, hexanoyloxy, acetoxymethyl, propionyloxymethyl, butyryloxymethyl, pentanoyloxymethyl, 2-acetoxyethyl, 2-propionyloxyethyl, 2-butyryloxyethyl, 3-acetoxypropyl,

3-propionyloxypropyl, 4-acetoxybutyl, methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl, butoxycarbonyl, pentoxycarbonyl, methoxycarbonylmethyl, ethoxycarbonylmethyl, propoxycarbonylmethyl, butoxycarbonylmethyl, 2-(methoxycarbonyl)ethyl, 2-(ethoxycarbonyl)ethyl, 2-(propoxycarbonyl)ethyl, 3-(methoxycarbonyl)propyl, 3-(ethoxycarbonyl)propyl or 4-(methoxycarbonyl)butyl.

If R^1 and/or R^2 are an alkyl radical in which one CH_2 group has been replaced by unsubstituted or substituted -CH=CH- and an adjacent CH_2 group has been replaced by -CO-, -CO-O- or -O-CO-, this may be straight-chain or branched. It is preferably straight-chain and has from 4 to 12 carbon atoms. Accordingly, it is particularly preferably acryloyloxymethyl, 2-acryloyloxyethyl, 3-acryloyloxypropyl, 4-acryloyloxybutyl, 5-acryloyloxypentyl, 6-acryloyloxyhexyl, 7-acryloyloxyheptyl, 8-acryloyloxyoctyl, 9-acryloyloxynonyl, 10-acryloyloxydecyl, methacryloyloxymethyl, 2-methacryloyloxyethyl, 3-methacryloyloxypropyl, 4-methacryloyloxybutyl, 5-methacryloyloxypentyl, 6-methacryloyloxyhexyl, 7-methacryloyloxyheptyl, 8-methacryloyloxyoctyl or 9-methacryloyloxynonyl.

If R^1 and/or R^2 are an alkyl or alkenyl radical which is monosubstituted by CN or CF_3, this radical is preferably straight-chain. The substitution by CN or CF_3 is possible in any desired position.

If R^1 and/or R^2 are an alkyl or alkenyl radical which is at least monosubstituted by halogen, this radical is preferably straight-chain and halogen is preferably F or Cl. In the case of polysubstitution, halogen is preferably F. The resultant radicals also include perfluorinated radicals. In the case of monosubstitution, the fluorine or chlorine substituent can be in any desired position, but preferably in the ω-position.

Compounds of the formula I which contain wing groups R^1 and/or R^2 which are suitable for polymerisation reactions are suitable for the preparation of liquid-crystalline polymers.

Compounds of the formula I containing branched wing groups R^1 and/or R^2 may occasionally be of importance owing to better solubility in the

conventional liquid-crystalline base materials, but in particular as chiral dopants if they are optically active. Smectic compounds of this type are suitable as components of ferroelectric materials.

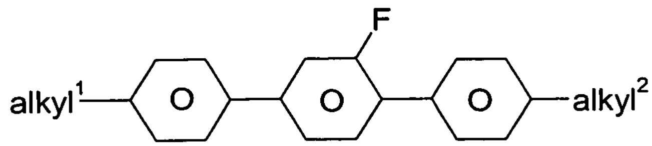
Compounds of the formula I having S_A phases are suitable, for example, for thermally addressed displays.

Branched groups of this type preferably contain not more than one chain branch. Preferred branched radicals R^1 and/or R^2 are isopropyl, 2-butyl (= 1-methylpropyl), isobutyl (= 2-methylpropyl), 2-methylbutyl, isopentyl (= 3-methylbutyl), 2-methylpentyl, 3-methylpentyl, 2-ethylhexyl, 2-propylpentyl, isopropoxy, 2-methylpropoxy, 2-methylbutoxy, 3-methylbutoxy, 2-methylpentoxy, 3-methylpentoxy, 2-ethylhexoxy, 1-methylhexoxy and 1-methylheptoxy.

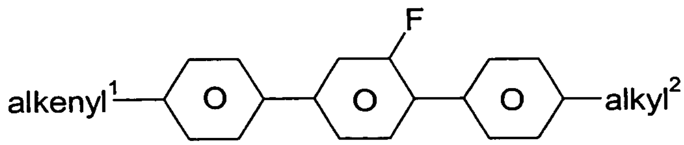
If R^1 and/or R^2 are an alkyl radical in which two or more CH_2 groups have been replaced by -O- and/or -CO-O-, this may be straight-chain or branched. It is preferably branched and has from 3 to 12 carbon atoms. Accordingly, it is particularly preferably biscarboxymethyl, 2,2-biscarboxyethyl, 3,3-biscarboxypropyl, 4,4-biscarboxybutyl, 5,5-biscarboxypentyl, 6,6-biscarboxyhexyl, 7,7-biscarboxyheptyl, 8,8-biscarboxyoctyl, 9,9-biscarboxynonyl, 10,10-biscarboxydecyl, bis(methoxycarbonyl)methyl, 2,2-bis(methoxycarbonyl)ethyl, 3,3-bis(methoxycarbonyl)propyl, 4,4-bis(methoxycarbonyl)butyl, 5,5-bis(methoxycarbonyl)pentyl, 6,6-bis(methoxycarbonyl)hexyl, 7,7-bis(methoxycarbonyl)heptyl, 8,8-bis(methoxycarbonyl)octyl, bis(ethoxycarbonyl)methyl, 2,2-bis(ethoxycarbonyl)ethyl, 3,3-bis(ethoxycarbonyl)propyl, 4,4-bis(ethoxycarbonyl)butyl or 5,5-bis(ethoxycarbonyl)pentyl.

R^1 and/or R^2 are preferably, independently of one another, identically or differently, H, a straight-chain alkyl radical having from 1 to 9 carbon atoms or a straight-chain alkenyl radical having from 2 to 9 carbon atoms.

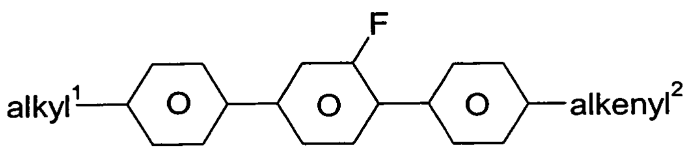
The compounds of the formula I are consequently preferably selected from the group consisting of the compounds of the following sub-formulae Ia to Id, where sub-formula Ia is particularly preferred:



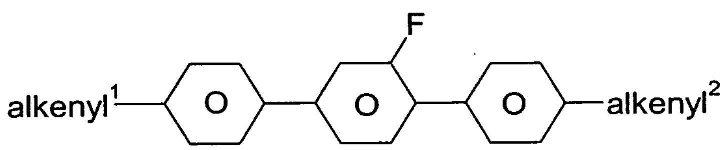
Ia



Ib



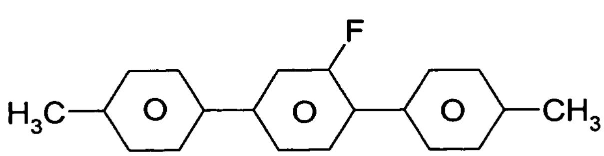
Ic



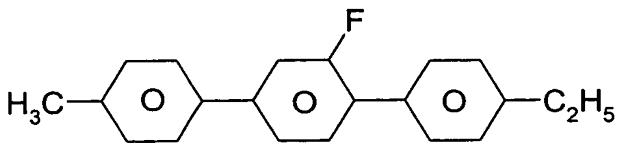
Id

where, in the formulae Ia to Id, the term "alkyl1" and "alkyl2" in each case, independently of one another, identically or differently, denotes a hydrogen atom or an alkyl radical having from 1 to 9 carbon atoms, preferably a straight-chain alkyl radical having from 1 to 5 carbon atoms, and the term "alkenyl1" and "alkenyl2" in each case, independently of one another, identically or differently, denotes an alkenyl radical having from 2 to 9 carbon atoms, preferably a straight-chain alkenyl radical having from 2 to 5 carbon atoms.

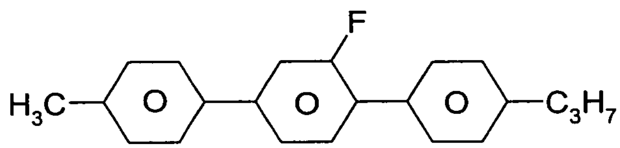
The compounds of the formula I are consequently particularly preferably selected from the group consisting of the compounds of the following sub-formulae I1 to I25:



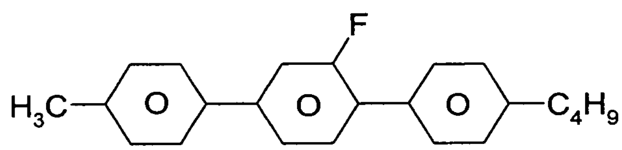
I1



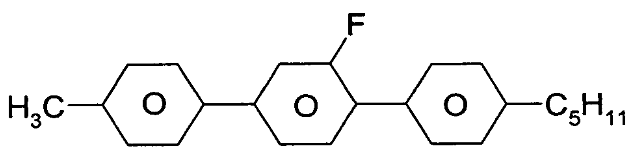
I2



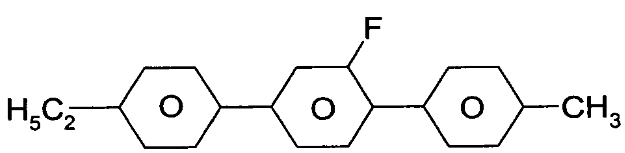
I3



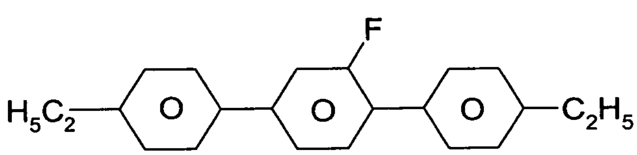
I4



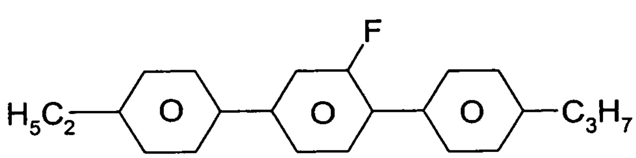
I5



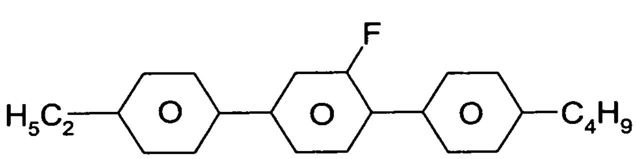
I6



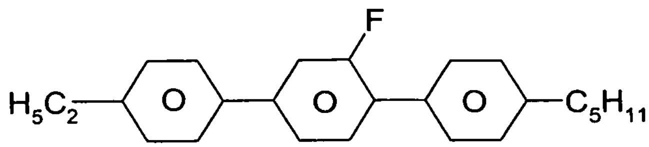
I7



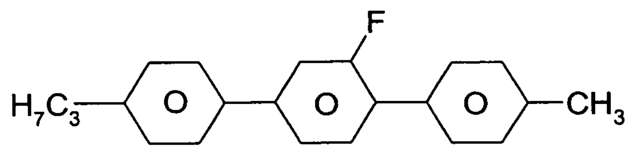
I8



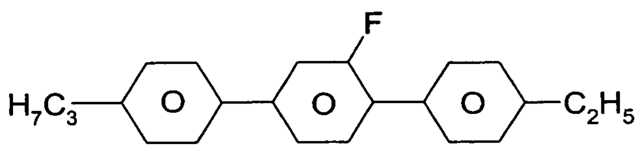
I9



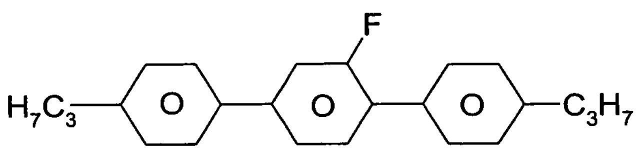
I10



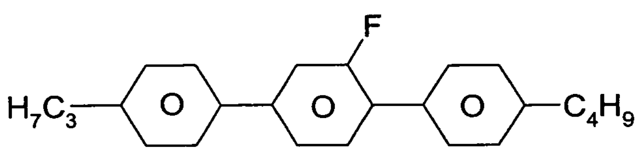
I11



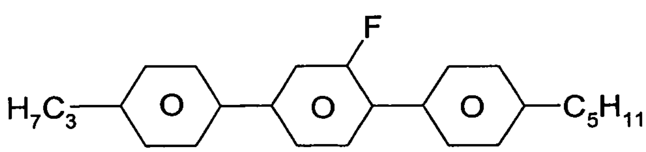
I12



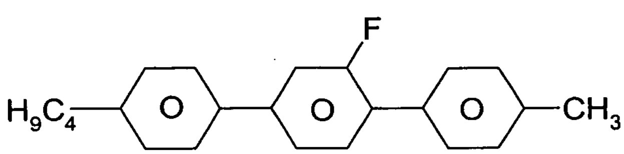
I13



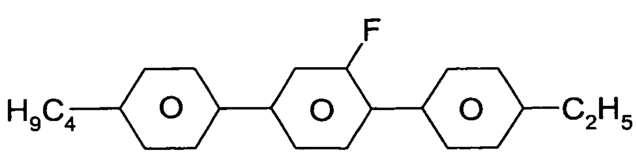
I14



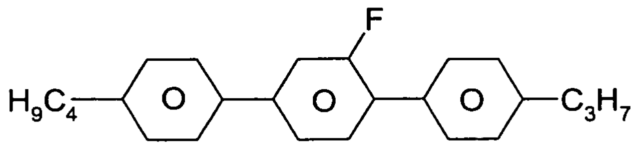
I15



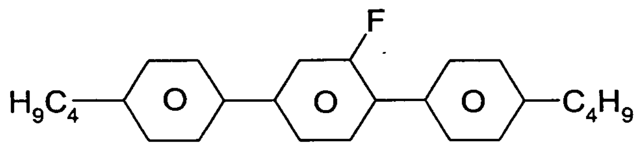
I16



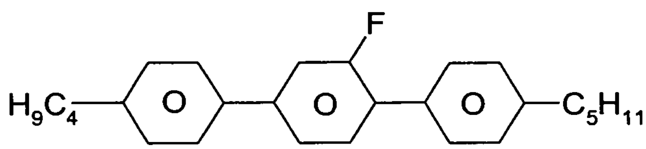
I17



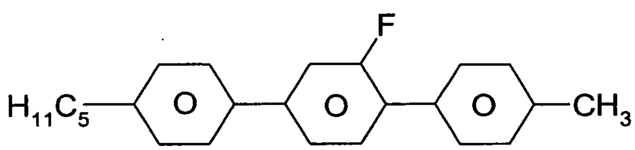
I18



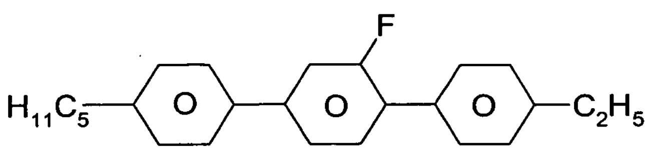
I19



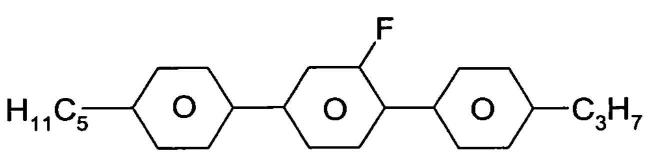
I20



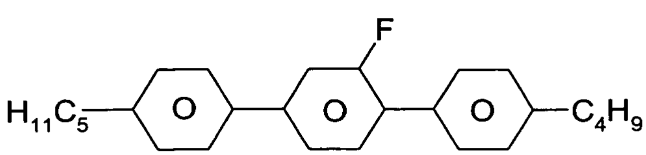
I21



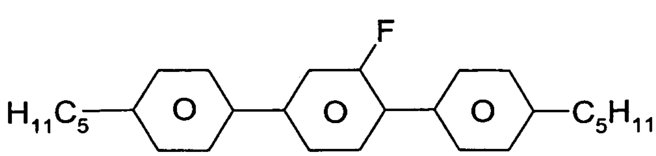
I22



I23



I24



I25

Particularly preferred compounds from the group consisting of the compounds of the sub-formulae I1 to I25 here are compounds in which the total number of carbon atoms in the two alkyl groups is in the range from 4 to 6. These are the compounds I3 to I5, I7 to I9, I11 to I13, I16, I17 and I21. Particular preference is given here to the sub-formulae I8, I9, I12 and I13.

The liquid-crystalline medium particularly preferably comprises one, two or three compounds of the formula I.

The proportion of compounds of the formula I in the mixture as a whole is from 1 to 60% by weight, preferably from 3 to 50% by weight and particularly preferably either from 3 to 12% by weight (embodiment A) or from 15 to 50% by weight (embodiment B).

The compounds of the formula I are prepared by methods known per se, as described in the literature (for example in the standard works, such as Houben-Weyl, Methoden der organischen Chemie [Methods of Organic Chemistry], Georg-Thieme-Verlag, Stuttgart), to be precise under reaction conditions which are known and suitable for the said reactions. Use can also be made here of variants which are known per se, but are not mentioned here in greater detail.

The compounds of the formula I are preferably prepared as described in EP 0 132 377 A2.

The present invention also relates to electro-optical display devices (in particular STN or MLC displays having two plane-parallel outer plates, which, together with a frame, form a cell, integrated non-linear elements for switching individual pixels on the outer plates, and a nematic liquid-crystal mixture of positive dielectric anisotropy and high specific resistance which is located in the cell) which contain the media according to the invention, and to the use of these media for electro-optical purposes. Besides reflective applications, the mixtures according to the invention are

also suitable for IPS (in plane switching) applications and OCB (optically controlled birefringence) applications.

The liquid-crystal mixtures according to the invention enable a significant widening of the available parameter latitude.

The achievable combinations of rotational viscosity γ_1 and optical anisotropy Δn are far superior to previous materials from the prior art.

The requirement for a high clearing point, nematic phase at low temperature, low rotational viscosity γ_1 and high Δn has hitherto only been achieved to an inadequate extent. Although systems such as, for example, the mixture of Comparative Example 2, which is commercially available from Merck, have similar properties to the mixtures according to the invention, they have, however, significantly worse values for the rotational viscosity γ_1.

Other mixture systems, such as, for example, the mixture of Comparative Example 1, which is commercially available from Merck, have comparable rotational viscosities γ_1, but have significantly worse values for the optical anisotropy Δn.

The liquid-crystal mixtures according to the invention, while retaining the nematic phase down to -20°C, preferably down to -30°C and particularly preferably down to -40°C, enable clearing points above 65°C, preferably above 70°C and particularly preferably above 75°C, simultaneously dielectric anisotropy values $\Delta\varepsilon$ of ≥ 4, preferably ≥ 4.5, and a high value for the specific resistance to be achieved, enabling excellent STN and MLC displays to be obtained. In particular, the mixtures are characterised by low operating voltages. The TN thresholds are below 2.0 V, preferably below 1.9 V and particularly preferably below 1.8 V.

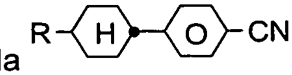
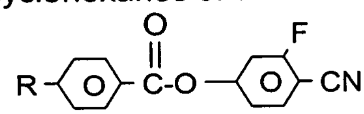
The liquid-crystal mixtures according to the invention have optical anisotropies Δn which, in the case of embodiment A, are preferably ≤ 0.100 and particularly preferably ≤ 0.095. In the case of embodiment B,

the optical anisotropies are preferably ≥ 0.160, particularly preferably ≥ 0.180 and in particular ≥ 0.200.

It goes without saying that, through a suitable choice of the components of the mixtures according to the invention, it is also possible for higher clearing points to be achieved at higher threshold voltages or lower clearing points to be achieved at lower threshold voltages with retention of the other advantageous properties. At viscosities correspondingly increased only slightly, it is likewise possible to obtain mixtures having greater $\Delta\varepsilon$ and thus lower thresholds. The MLC displays according to the invention preferably operate at the first Gooch and Tarry transmission minimum [C.H. Gooch and H.A. Tarry, Electron. Lett. 10, 2-4, 1974; C.H. Gooch and H.A. Tarry, Appl. Phys., Vol. 8, 1575-1584, 1975], where particularly favourable electro-optical properties, such as, for example, high steepness of the characteristic line and low angle dependence of the contrast (German Patent 30 22 818), are achieved. In addition, significantly higher specific resistances can be achieved using the mixtures according to the invention at the first minimum than in the case of mixtures comprising cyano compounds. Through a suitable choice of the individual components and their proportions by weight, the person skilled in the art is able to set the birefringence necessary for a pre-specified layer thickness of the MLC display using simple routine methods.

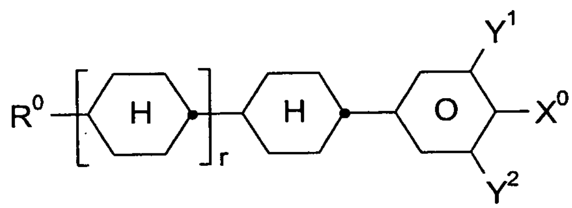
The rotational viscosity γ_1 of the mixtures according to the invention at 20°C is preferably ≤ 180 mPa·s, particularly preferably ≤ 160 mPa·s. In a specific embodiment (embodiment A), the rotational viscosity γ_1 is particularly preferably ≤ 80 mPa·s and in particular ≤ 70 mPa·s. The ratio γ_1 to $(\Delta n)^2$ here is preferably ≤ 8000, particularly preferably ≤ 7000. In a specific embodiment (embodiment B), the ratio is particularly preferably ≤ 5000 and in particular ≤ 4500. The nematic phase range is preferably at least 90°C and extends at least from -20° to +70°C.

Measurements of the capacity holding ratio (HR) [S. Matsumoto et al., Liquid Crystals 5, 1320 (1989); K. Niwa et al., Proc. SID Conference, San Francisco, June 1984, p. 304 (1984); G. Weber et al., Liquid Crystals 5, 1381 (1989)] have shown that mixtures according to the invention com-

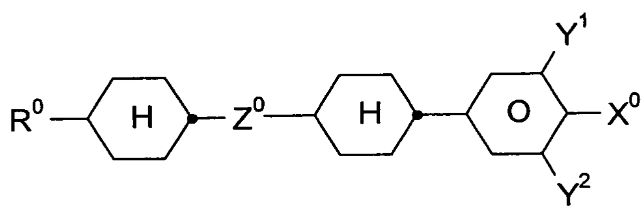
prising compounds of the formula I exhibit a significantly smaller decrease in the HR with increasing temperature than analogous mixtures comprising cyanophenylcyclohexanes of the formula  or esters of the formula  instead of the compounds of the formula I according to the invention.

The UV stability of the mixtures according to the invention is also considerably better, i.e. they exhibit a significantly smaller decrease in the HR on exposure to UV.

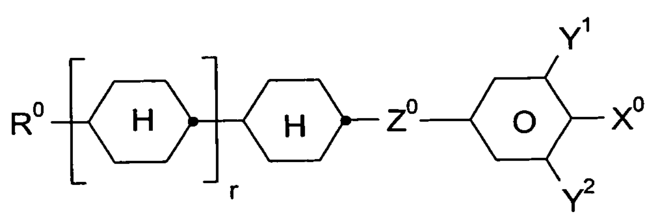
Besides at least one compound of the formula I, the medium according to the invention additionally comprises one or more compounds selected from the group consisting of compounds of the general formulae II to X:



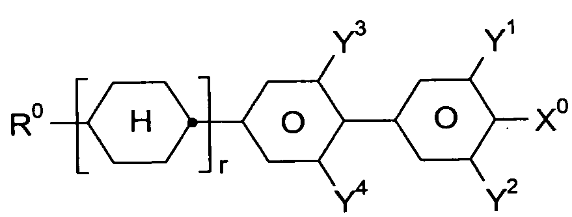
II



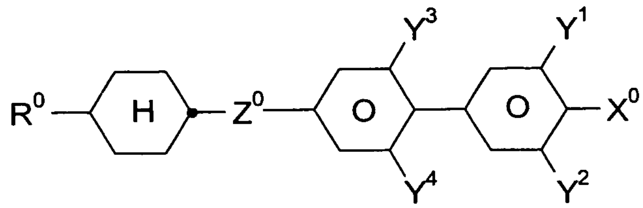
III



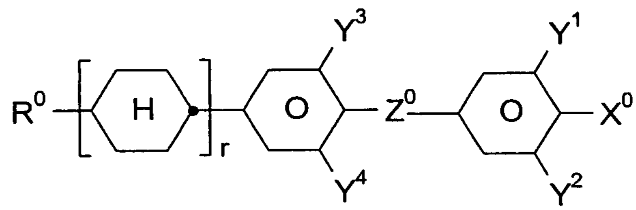
IV



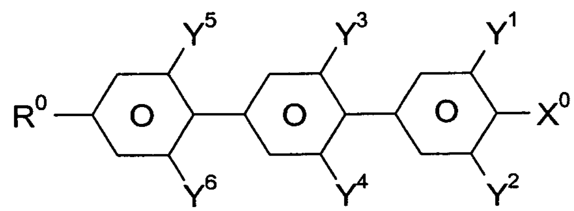
V



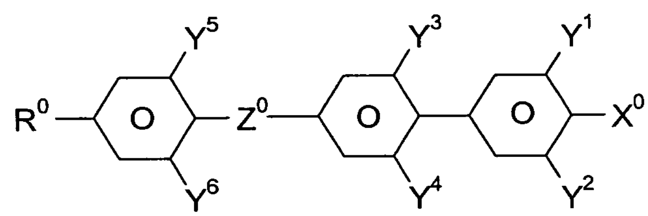
VI



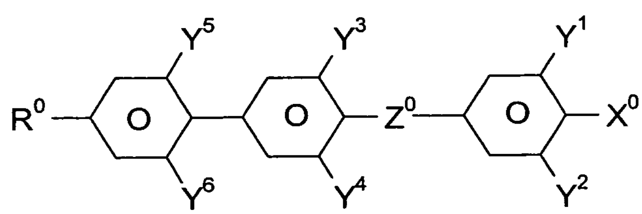
VII



VIII



IX



X

in which the individual radicals have the following meanings:

R^0: n-alkyl, oxaalkyl, fluoroalkyl or alkenyl, each having up to 9 carbon atoms;

X^0: F, Cl, halogenated alkyl or halogenated alkoxy having from 1 to 6 carbon atoms, or halogenated alkenyl having from 2 to 6 carbon atoms;

Z^0: $-CF_2O-$, $-OCF_2-$, $-CH_2O-$, $-OCH_2-$, -CO-O-, -O-CO-, -CH=CH-, $-C_2H_4-$, $-C_2F_4-$, $-CH_2CF_2-$, $-CF_2CH_2-$ or $-C_4H_8-$;

Y^1, Y^2, Y^3, Y^4, Y^5 and Y^6: each, independently of one another, H or F;

r: 0 or 1, preferably 1.

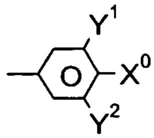
The term "alkyl" covers straight-chain and branched alkyl groups having from 1 to 9 carbon atoms, preferably the straight-chain groups methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl and nonyl. Groups having from 1 to 5 carbon atoms are particularly preferred.

The term "alkenyl" covers straight-chain and branched alkenyl groups having from 2 to 9 carbon atoms, preferably the straight-chain groups having from 2 to 7 carbon atoms. Preferred alkenyl groups are C_2-C_7-1E-alkenyl, C_4-C_7-3E-alkenyl, C_5-C_7-4-alkenyl, C_6-C_7-5-alkenyl and C_7-6-alkenyl, in particular C_2-C_7-1E-alkenyl, C_4-C_7-3E-alkenyl and C_5-C_7-4-alkenyl. Examples of preferred alkenyl groups are vinyl, 1E-propenyl, 1E-butenyl, 1E-pentenyl, 1E-hexenyl, 1E-heptenyl, 3-butenyl, 3E-pentenyl, 3E-hexenyl, 3E-heptenyl, 4-pentenyl, 4Z-hexenyl, 4E-hexenyl, 4Z-heptenyl, 5-hexenyl, 6-heptenyl and the like. Groups having up to 5 carbon atoms are particularly preferred.

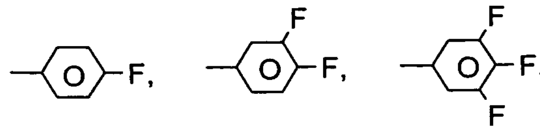
The term "fluoroalkyl" preferably covers straight-chain groups having a terminal fluorine, i.e. fluoromethyl, 2-fluoroethyl, 3-fluoropropyl, 4-fluorobutyl, 5-fluoropentyl, 6-fluorohexyl and 7-fluoroheptyl. However, other positions of the fluorine are not excluded.

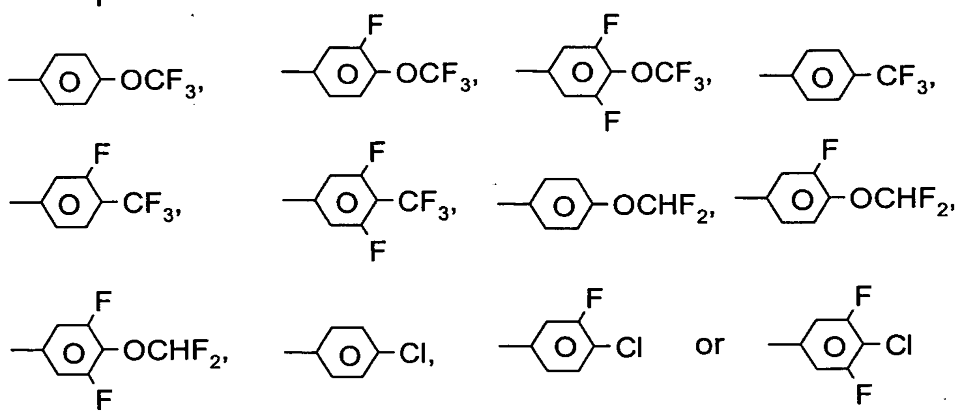
The term "oxaalkyl" preferably covers straight-chain radicals of the formula C_nH_{2n+1}-O-$(CH_2)_m$, in which n and m are each, independently of one another, from 1 to 6. Preferably, n = 1 and m = 1 to 6.

In the formulae II to X,

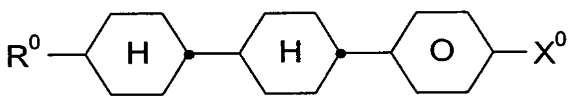


is preferably

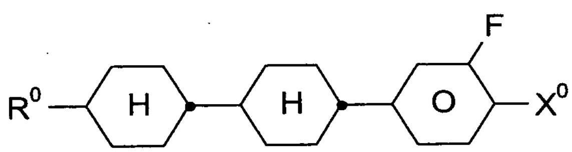




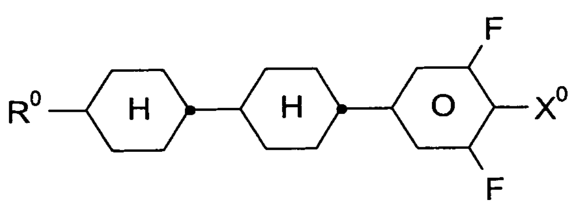
The compound of the formula II is preferably



IIa



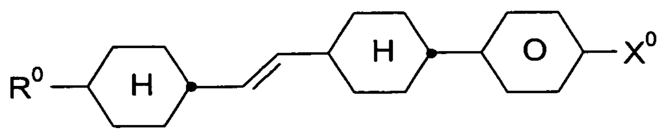
IIb



IIc

in which R^0 and X^0 can adopt the meanings indicated above. Preferably, however, R^0 is n-alkyl or alkenyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms or alkenyl having from 2 to 5 carbon atoms, and X^0 is F, OCF_3, CF_3 or $OCHF_2$.

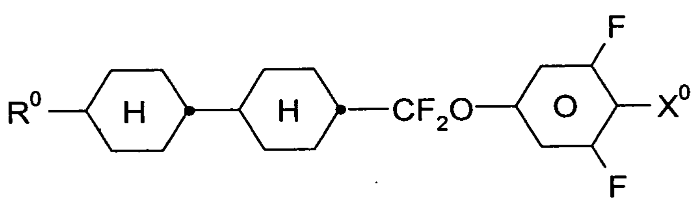
The compound of the formula III is preferably



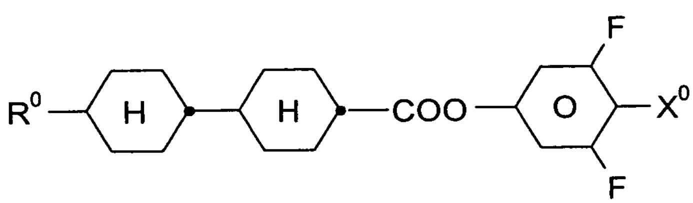
IIIa

in which R^0 and X^0 can adopt the meanings indicated above. Preferably, however, R^0 is n-alkyl or alkenyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms or alkenyl having from 2 to 5 carbon atoms, and X^0 is F, OCF_3, CF_3 or $OCHF_2$.

The compound of the formula IV is preferably



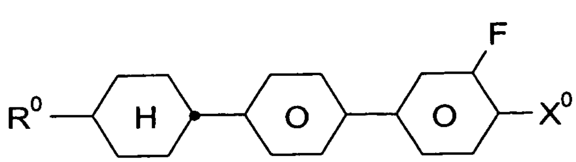
IVa



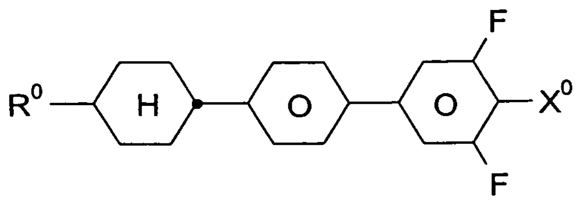
IVb

in which R^0 and X^0 can adopt the meanings indicated above. Preferably, however, R^0 is n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms, and X^0 is F, OCF_3, CF_3 or $OCHF_2$, particularly preferably F.

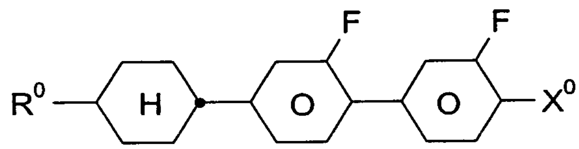
The compound of the formula V is preferably



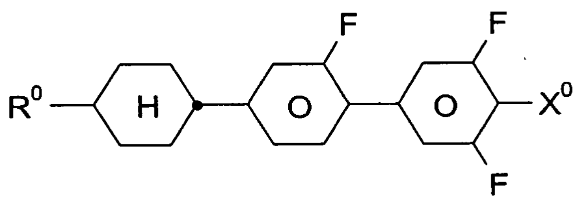
Va



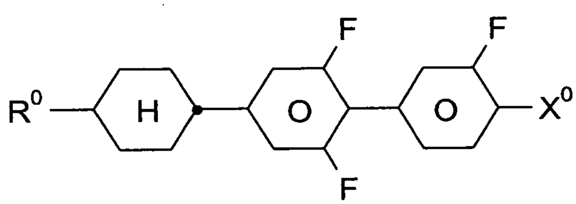
Vb



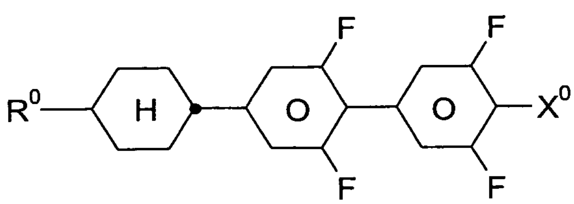
Vc



Vd



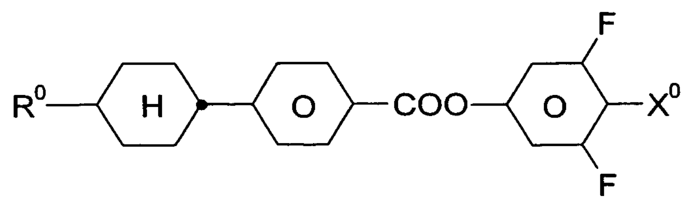
Ve



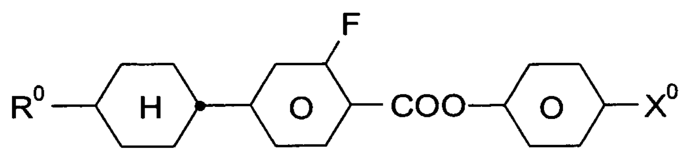
Vf

in which R^0 and X^0 can adopt the meanings indicated above. Preferably, however, R^0 is n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms, and X^0 is F, OCF_3, CF_3 or $OCHF_2$, particularly preferably F. Particular preference is given to the formula Vc.

The compound of the formula VII is preferably



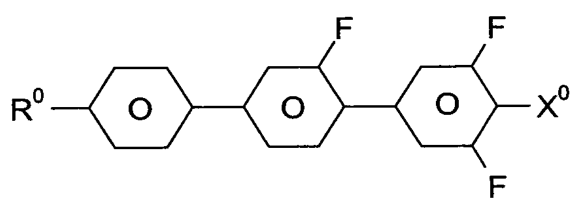
VIIa



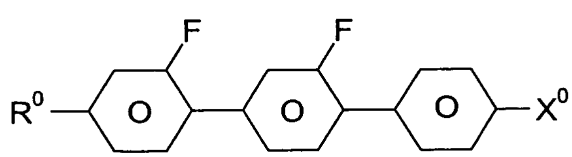
VIIb

in which R^0 and X^0 can adopt the meanings indicated above. Preferably, however, R^0 is n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms, and X^0 is F, OCF_3, CF_3 or $OCHF_2$.

The compound of the formula VIII is preferably



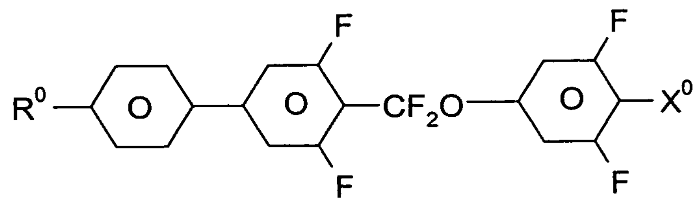
VIIIa



VIIIb

in which R^0 and X^0 can adopt the meanings indicated above. Preferably, however, R^0 is n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms, and X^0 is F, OCF_3, CF_3 or $OCHF_2$, particularly preferably F.

The compound of the formula X is preferably



Xa

in which R^0 and X^0 can adopt the meanings indicated above. Preferably, however, R^0 is n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms, and X^0 is F, OCF_3, CF_3 or $OCHF_2$, particularly preferably F.

Particularly preferred embodiments are indicated below.

- The medium comprises one or more compounds of the formulae II, III, IV, V, VI, VII, VIII, IX and/or X, preferably one or more compounds of the formulae IIa, IIb, IIc, IIIa, IVa, IVb, Vc, VIIa, VIIb, VIIIa, VIIIb and/or Xa.

- The proportion of compounds of the formulae II to X in the mixture as a whole is from 20 to 70% by weight, preferably from 30 to 60% by weight and particularly preferably from 35 to 55% by weight.

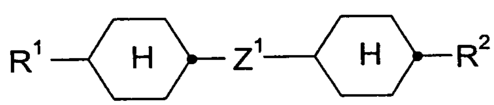
- The proportion of compounds of the formulae I to X together in the mixture as a whole is at least 30% by weight, preferably at least 40% by weight and particularly preferably at least 50% by weight.

- The medium essentially consists of compounds of the formulae I to X.

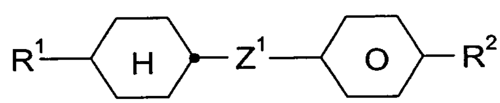
- The I : (II + III + IV + V + VI + VII + VIII + IX + X) weight ratio is preferably in the range from 1 : 10 to 10 : 1.

The optimum mixing ratio of the compounds of the formulae I and II + III + IV + V + VI + VII + VIII + IX + X depends substantially on the desired properties, on the choice of the components of the formulae I, II, III, IV, V, VI, VII, VIII, IX and/or X and on the choice of any other components present. Suitable mixing ratios within the ranges indicated above can easily be determined from case to case.

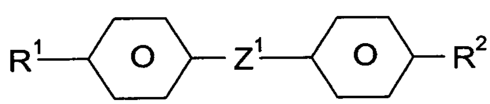
Besides at least one compound of the formula I and at least one compound selected from the group consisting of compounds of the general formulae II to X, the medium according to the invention additionally comprises one or more compounds selected from the group consisting of compounds of the general formulae XI to XVII:



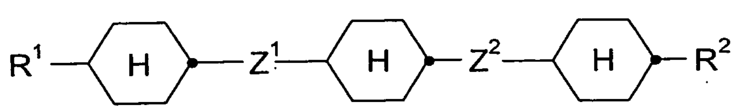
XI



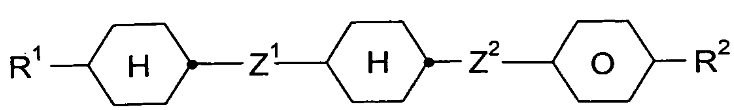
XII



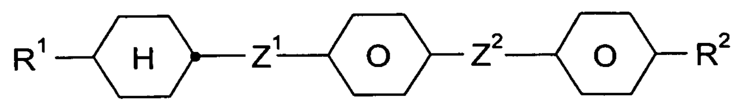
XIII



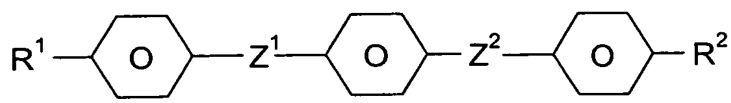
XIV



XV



XVI



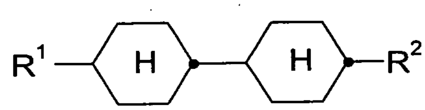
XVII

in which the individual radicals have the following meanings:

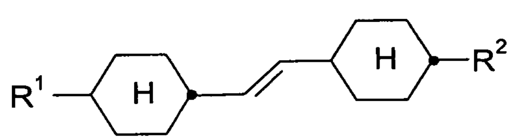
R^1 and R^2: independently of one another, identically or differently, n-alkyl, n-alkoxy or alkenyl, each having up to 9 carbon atoms; and

Z^1 and Z^2: independently of one another, identically or differently, a single bond, $-CF_2O-$, $-OCF_2-$, $-CH_2O-$, $-OCH_2-$, -CO-O-, -O-CO-, -CH=CH-, $-C_2H_4-$, $-C_2F_4-$, $-CH_2CF_2-$, $-CF_2CH_2-$ or $-C_4H_8-$, preferably each a single bond.

The compound of the formula XI is preferably



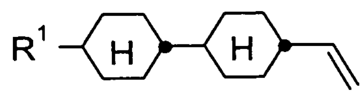
XIa



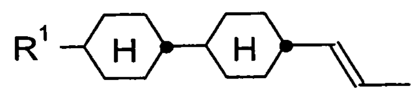
XIb

in which R^1 and R^2 can adopt the meanings indicated above. Preferably, however, R^1 is n-alkyl or alkenyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms or alkenyl having from 2 to 5 carbon atoms, and R^2 is alkenyl having up to 9 carbon atoms, particularly preferably alkenyl having from 2 to 5 carbon atoms.

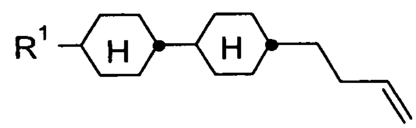
Particularly preferred compounds of the formula XIa are



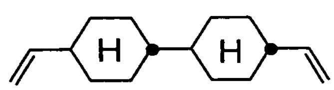
XIa1



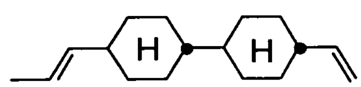
XIa2



XIa3



XIa4



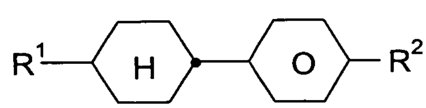
XIa5

in which R^1 can adopt the meanings indicated above, but is preferably n-alkyl having from 1 to 5 carbon atoms.

The compounds of the formulae XIa1 and XIa2 are particularly preferred.

The compound of the formula XII is preferably

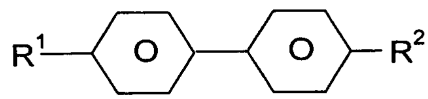
XIIa



in which R^1 and R^2 can adopt the meanings indicated above. Preferably, however, R^1 is n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms, and R^2 is alkoxy having up to

9 carbon atoms, particularly preferably alkoxy having from 1 to 5 carbon atoms.

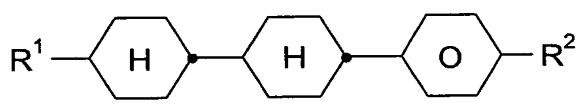
The compound of the formula XIII is preferably



XIIIa

in which R^1 and R^2 can adopt the meanings indicated above. Preferably, however, R^1 is n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms, and R^2 is alkenyl having up to 9 carbon atoms, particularly preferably alkenyl having from 2 to 5 carbon atoms.

The compound of the formula XV is preferably



XVa

in which R^1 and R^2 can adopt the meanings indicated above. Preferably, however, R^1 is alkenyl having up to 9 carbon atoms, particularly preferably alkenyl having from 2 to 5 carbon atoms, and R^2 is n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms.

Particularly preferred embodiments are indicated below.

- The medium comprises one or more compounds of the formulae XI, XII, XIII, XIV, XV, XVI and/or XVII, preferably one or more compounds of the formulae XIa, XIb, XIIa, XIIIa and/or XVa.

- The proportion of compounds of the formulae XI to XVII in the mixture as a whole is from 5 to 70% by weight, preferably from 10 to 60% by

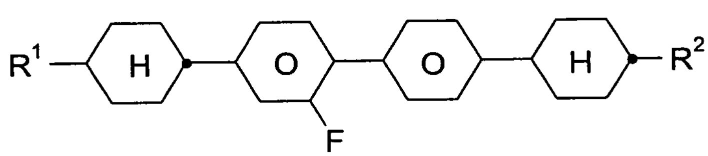
weight and particularly preferably either from 10 to 30% by weight (embodiment B) or from 35 to 55% by weight (embodiment A).

- The proportion of compounds of the formulae I to XVII together in the mixture as a whole is at least 50% by weight, preferably at least 70% by weight and particularly preferably at least 90% by weight.

- The medium essentially consists of compounds of the formulae I to XVII.

The total amount of compounds of the formulae I to XVII in the mixtures according to the invention is not crucial. The mixtures may therefore comprise one or more further components in order to optimise various properties. However, the observed effect on the rotational viscosity and the optical anisotropy is generally greater the higher the total concentration of compounds of the formulae I to XVII.

Furthermore, the medium according to the invention may additionally comprise one or more compounds selected from compounds of the general formula XVIII:

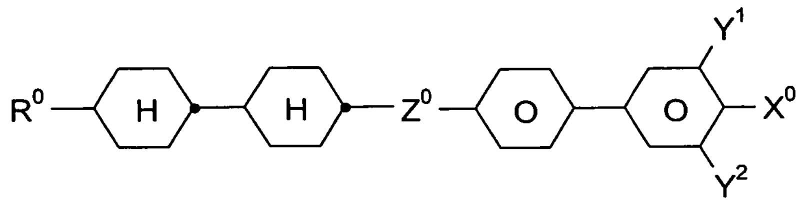


XVIII

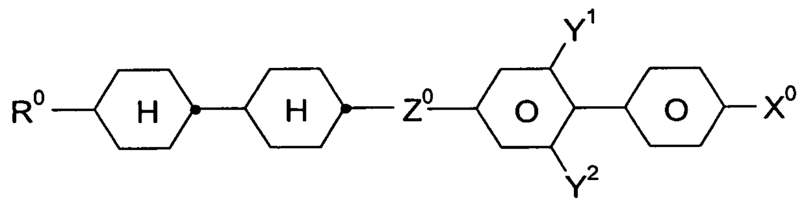
in which R^1 and R^2 can adopt the meanings indicated above. Preferably, however, R^1 and R^2 are n-alkyl having up to 9 carbon atoms, particularly preferably n-alkyl having from 1 to 5 carbon atoms.

The proportion of compounds of the formula XVIII in the mixture as a whole can be up to 10% by weight.

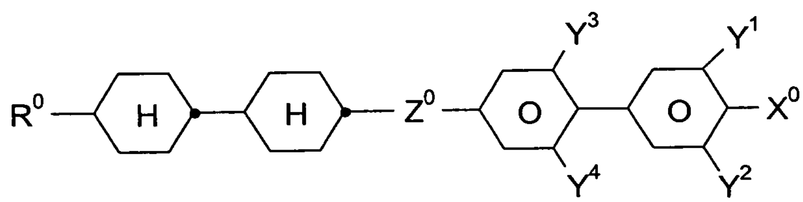
In addition, the medium according to the invention may additionally comprise one or more compounds selected from the group consisting of compounds of the general formulae XIX to XXVI:



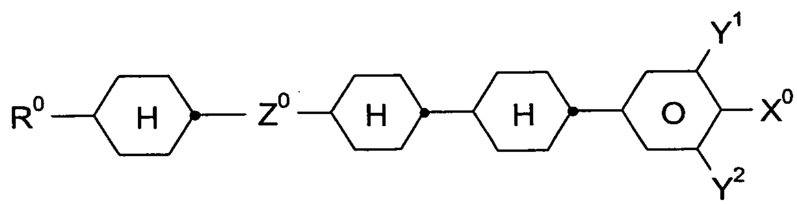
XIX



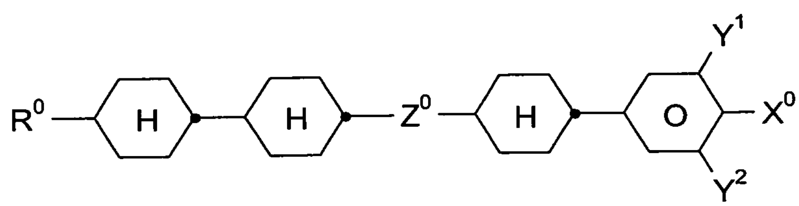
XX



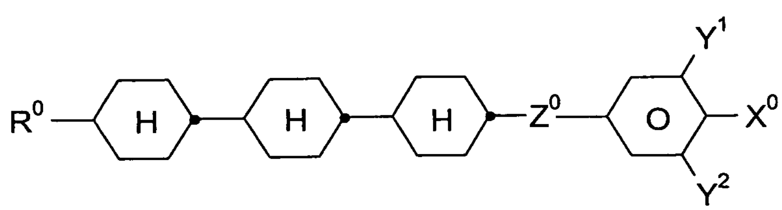
XXI



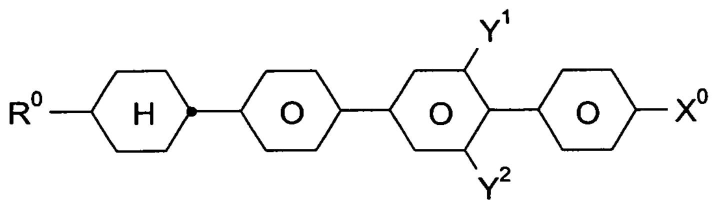
XXII



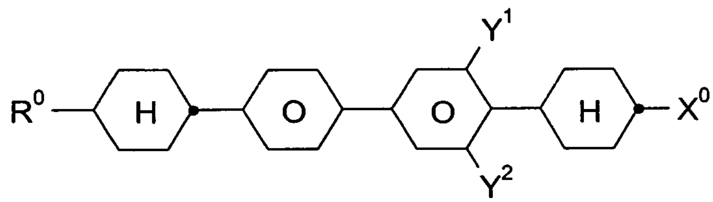
XXIII



XXIV



XXV



XXVI

in which R^0, X^0, Y^1, Y^2, Y^3, Y^4 and Z^0 each, independently of one another, have one of the meanings indicated above. Preferably, X^0 is F, Cl, CF_3, OCF_3 or $OCHF_2$. R^0 is preferably alkyl, oxaalkyl, fluoroalkyl or alkenyl, each having up to 6 carbon atoms, and Z^0 is preferably a single bond or $-CH_2-CH_2-$. Y^1, Y^2, Y^3 and Y^4 are each, independently of one another, H or F.

The individual compounds of the formulae II to XXVI and their sub-formulae which can be used in the media according to the invention are either known or can be prepared analogously to known compounds.

It has been found that even a relatively small proportion of compounds of the formula I mixed with conventional liquid-crystal materials, but in particular with one or more compounds of the formulae II, III, IV, V, VI, VII, VIII, IX and/or X, results in a significant reduction in the rotational viscosity γ_1 and in higher values for the optical anisotropy Δn, enabling shorter response times of the displays to be achieved, with broad nematic phases having low smectic-nematic transition temperatures being observed at the same time, causing an improvement in the storage stability. The compounds of the formulae I to X are colourless, stable and readily miscible with one another and with other liquid-crystal materials. The

mixtures according to the invention are furthermore distinguished by very high clearing points.

The construction of the MLC display according to the invention from polarisers, electrode base plates and electrodes having a surface treatment corresponds to the conventional design for displays of this type. The term conventional design here is broadly drawn and also covers all derivatives and modifications of the MLC display, in particular also matrix display elements based on poly-Si TFT or MIM.

An essential difference between the displays according to the invention and the hitherto conventional displays based on the twisted nematic cell consists, however, in the choice of the liquid-crystal parameters of the liquid-crystal layer.

The liquid-crystal mixtures which can be used in accordance with the invention are prepared in a manner conventional per se. In general, the desired amount of the components used in lesser amount is dissolved in the components making up the principal constituent, preferably at elevated temperature. It is also possible to mix solutions of the components in an organic solvent, for example in acetone, chloroform or methanol, and to remove the solvent again, for example by distillation, after mixing.

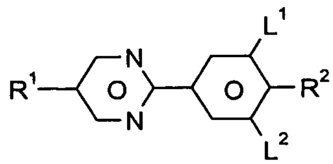
The dielectrics may also comprise further additives known to the person skilled in the art and described in the literature. For example, from 0 to 15% of pleochroic dyes and/or chiral dopants may be added.

In the present application and in the following examples, the structures of the liquid-crystal compounds are indicated by means of acronyms, with the transformation into chemical formulae taking place in accordance with Tables A and B below. All radicals C_nH_{2n+1} and C_mH_{2m+1} are straight-chain alkyl radicals having n and m carbon atoms respectively; n and m are preferably 0, 1, 2, 3, 4, 5, 6 or 7. The coding in Table B is self-evident. In Table A, only the acronym for the parent structure is indicated. In individual cases, the acronym for the parent structure is followed, separated by a dash, by a code for the substituents R^1, R^2, L^1 and L^2.

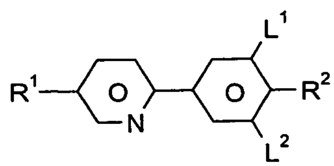
Code for R^1, R^2, L^1, L^2	R^1	R^2	L^1	L^2
nm	C_nH_{2n+1}	C_mH_{2m+1}	H	H
nOm	C_nH_{2n+1}	OC_mH_{2m+1}	H	H
nO.m	OC_nH_{2n+1}	C_mH_{2m+1}	H	H
n	C_nH_{2n+1}	CN	H	H
nN.F	C_nH_{2n+1}	CN	H	F
nF	C_nH_{2n+1}	F	H	H
nOF	OC_nH_{2n+1}	F	H	H
nCl	C_nH_{2n+1}	Cl	H	H
nF.F	C_nH_{2n+1}	F	H	F
nF.F.F	C_nH_{2n+1}	F	F	F
nCF_3	C_nH_{2n+1}	CF_3	H	H
$nOCF_3$	C_nH_{2n+1}	OCF_3	H	H
$nOCF_2$	C_nH_{2n+1}	$OCHF_2$	H	H
nS	C_nH_{2n+1}	NCS	H	H
rVsN	C_rH_{2r+1}-CH=CH-C_sH_{2s}-	CN	H	H
rEsN	C_rH_{2r+1}-O-C_sH_{2s}-	CN	H	H
nAm	C_nH_{2n+1}	$COOC_mH_{2m+1}$	H	H
$nOCCF_2$.F.F	C_nH_{2n+1}	OCH_2CHF_2	F	F
V-n	CH_2=CH	C_nH_{2n+1}	H	H

Preferred mixture components of the mixture concept according to the invention are shown in Tables A and B:

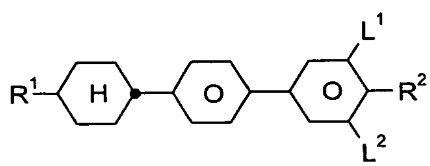
Table A:



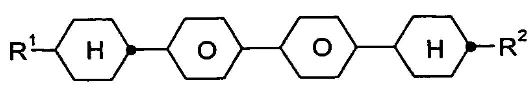
PYP



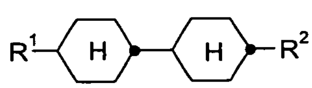
PYRP



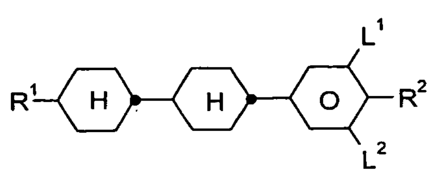
BCH



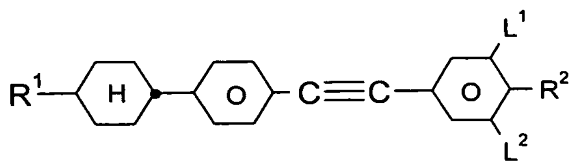
CBC



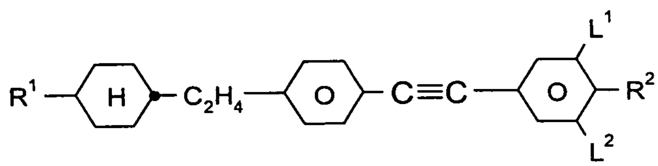
CCH



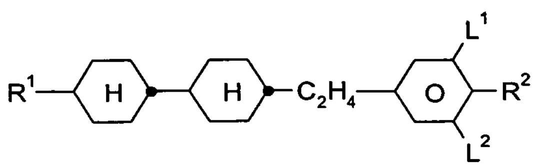
CCP



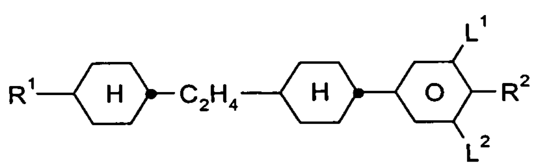
CPTP



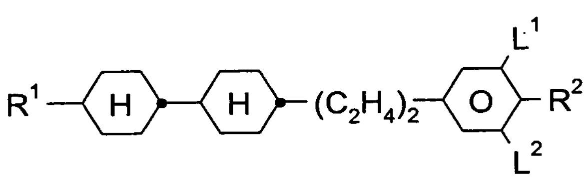
CEPTP



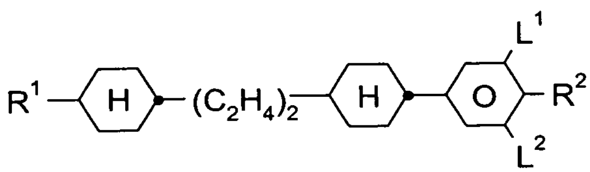
ECCP



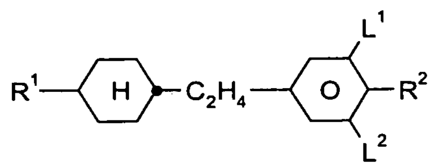
CECP



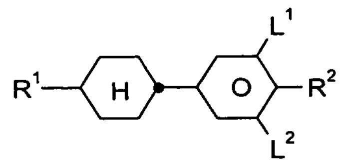
CCEEP



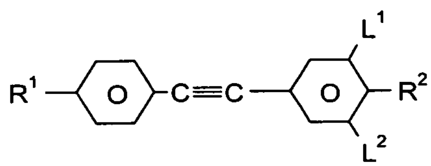
CEECP



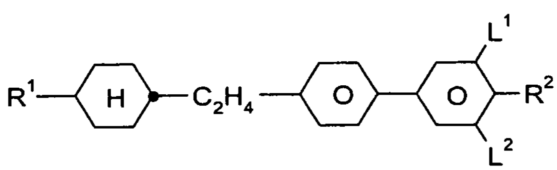
EPCH



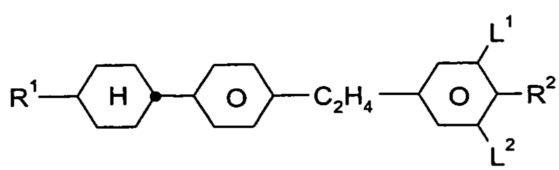
PCH



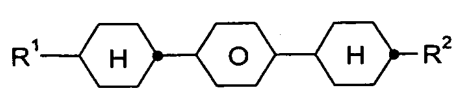
PTP



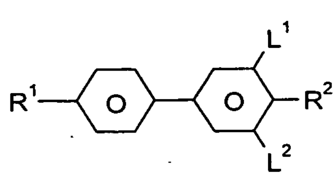
BECH



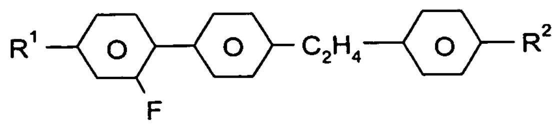
EBCH



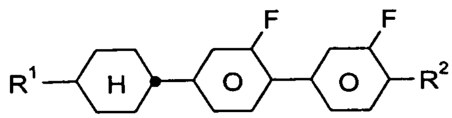
CPC



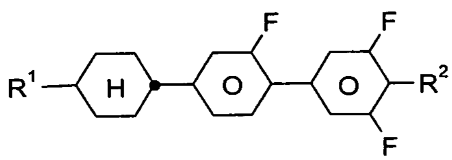
B



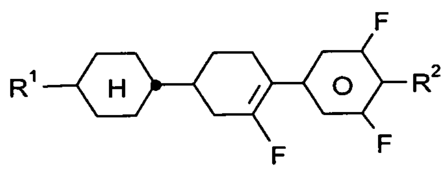
FET



CGG

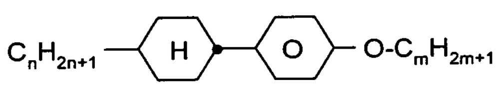


CGU

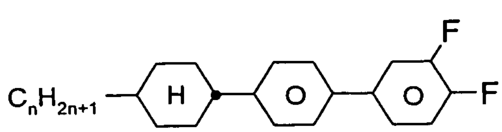


CFU

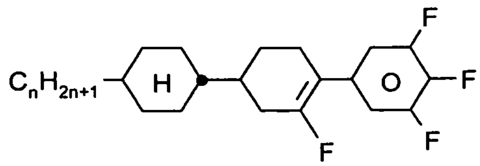
Table B:



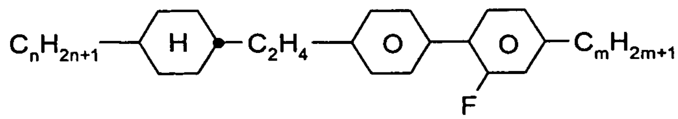
PCH-nOm



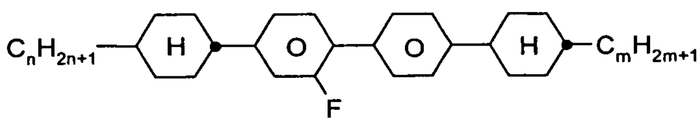
BCH-nF.F



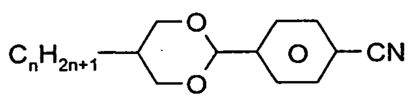
CFU-n-F



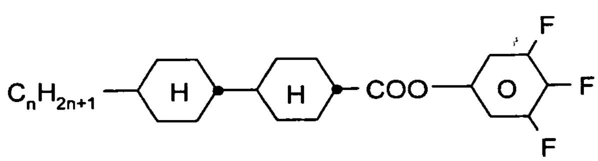
Inm



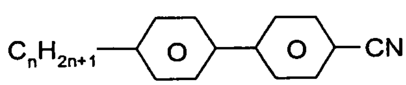
CBC-nmF



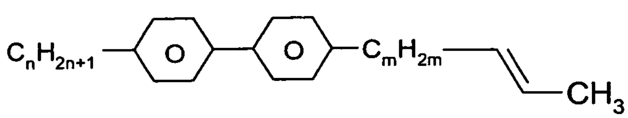
PDX-n



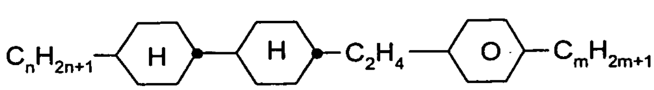
CCZU-n-F



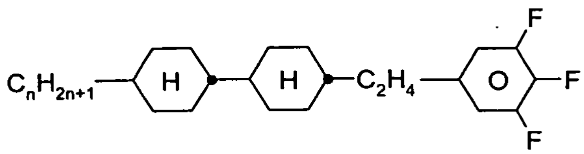
K3n



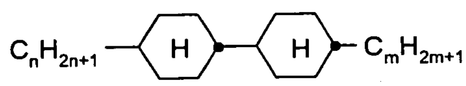
PP-n-mV1



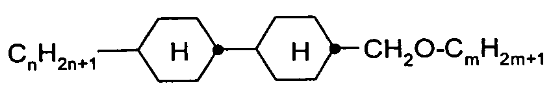
ECCP-nm



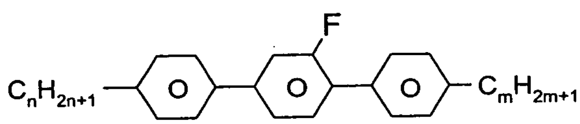
ECCP-nF.F.F



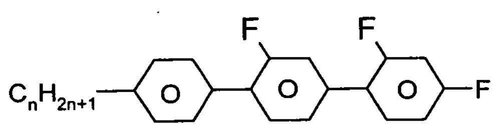
CCH-nm



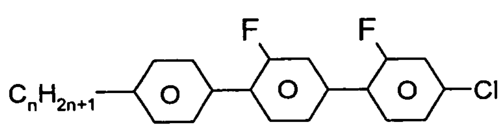
CCH-n1Em



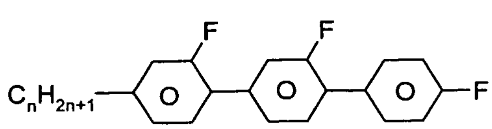
PGP-n-m



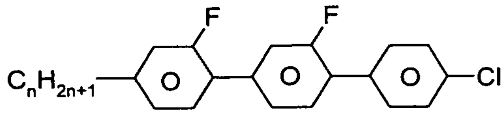
PGIGI-n-F



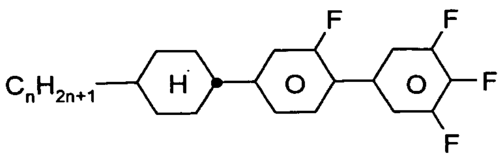
PGIGI-n-Cl



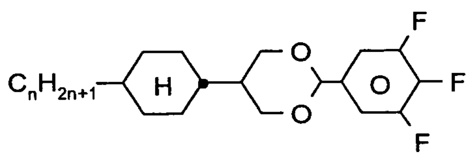
GGP-n-F



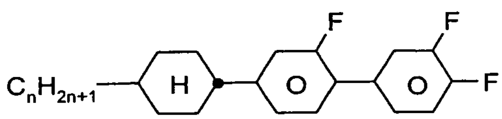
GGP-n-Cl



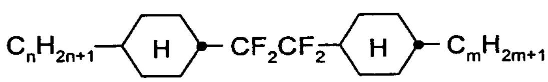
CGU-n-F



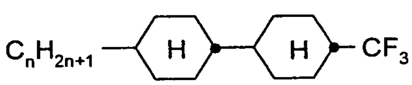
CDU-n-F



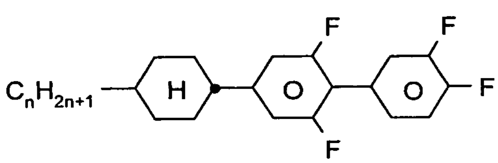
CGG-n-F



CWC-n-m



CCH-nCF_3



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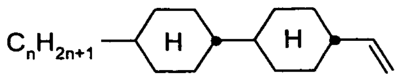

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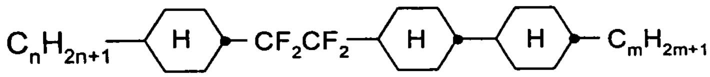

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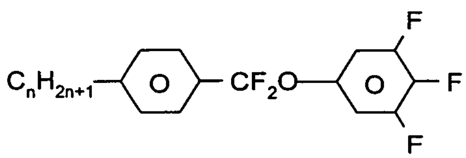

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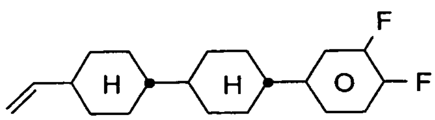
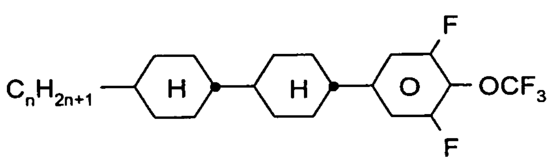


CCG-V-F



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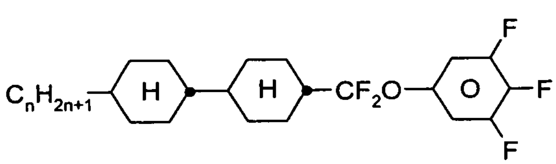
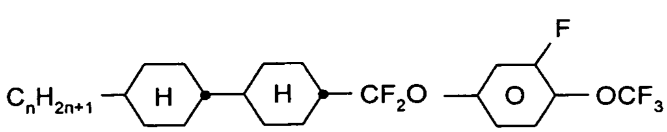
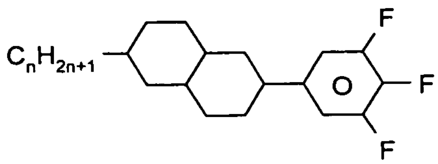


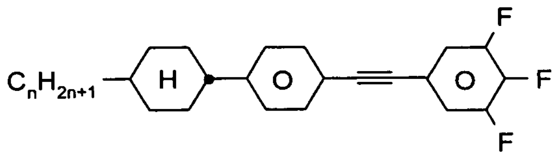
CCQU-n-F



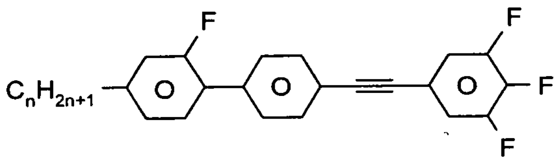
CCQG-n-OT



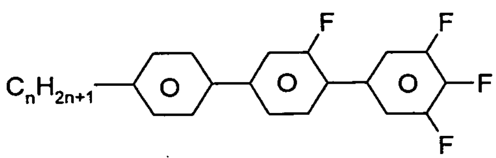
Dec-U-n-F



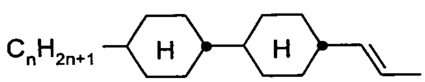
CPTU-n-F



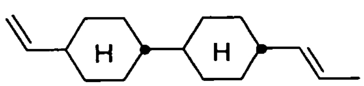
GPTU-n-F



PGU-n-F



CC-n-V1



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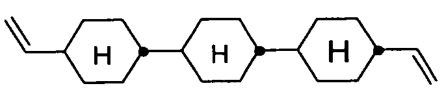
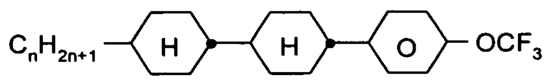


CCC-V-V



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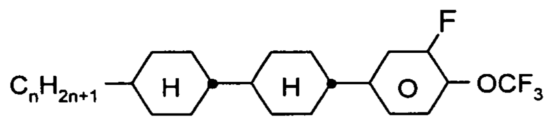

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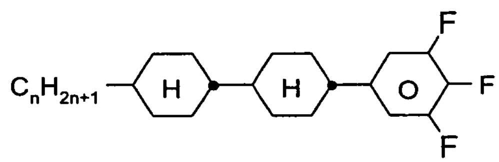

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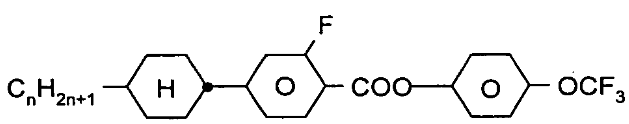
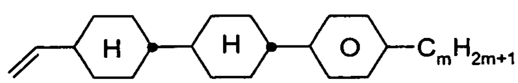


CGZP-n-OT



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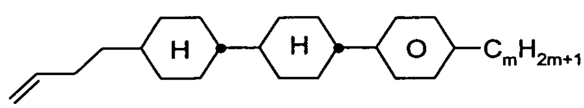
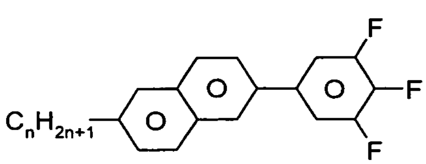
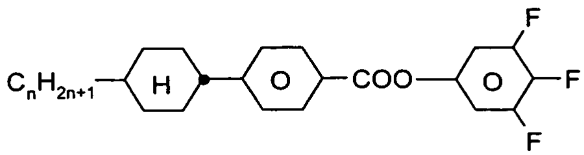


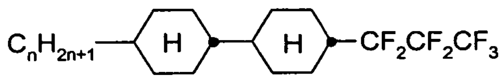
CCP-V2-m



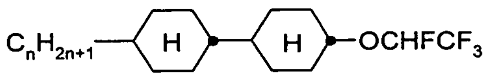
Nap-U-n-F



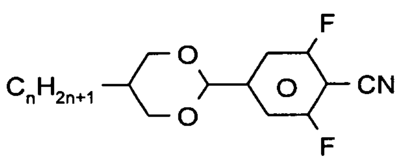
CPZU-n-F



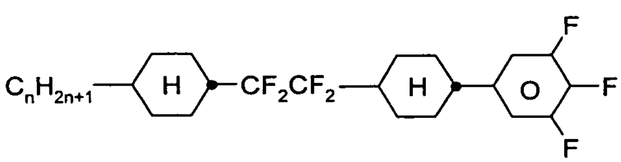
CC-n-DDT



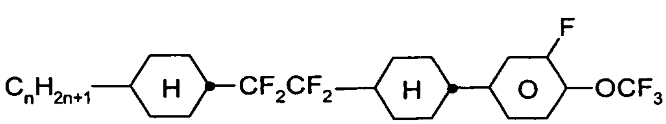
CC-n-OMT



DU-n-N



CWCU-n-F



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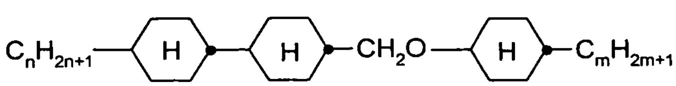

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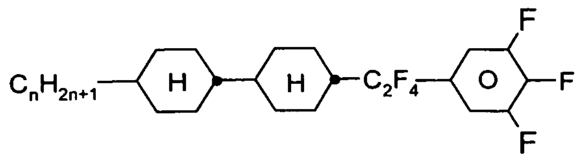

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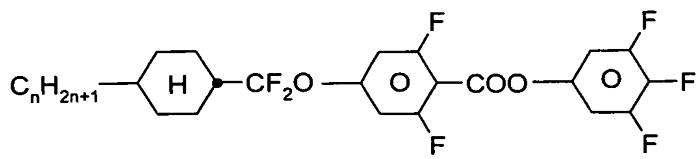

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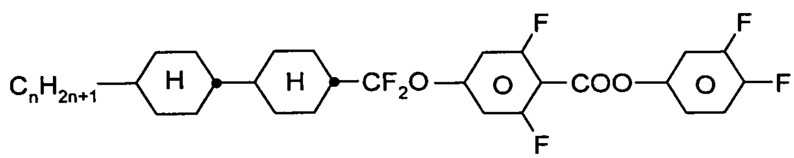

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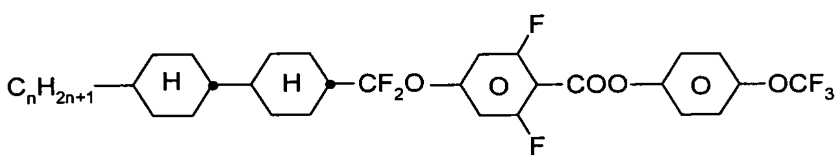

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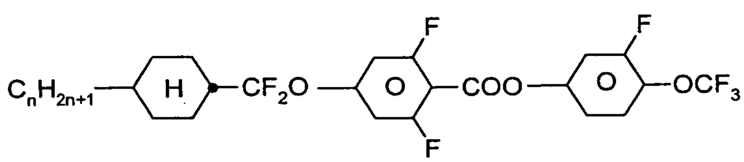

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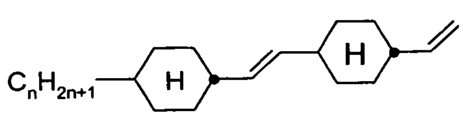
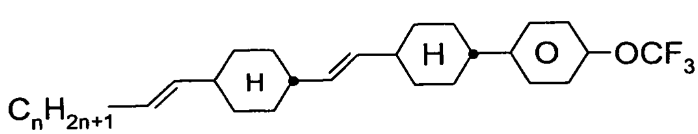
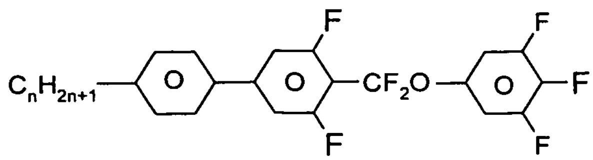


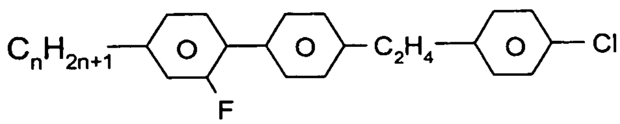
CVC-n-V



CVCP-nV-OT



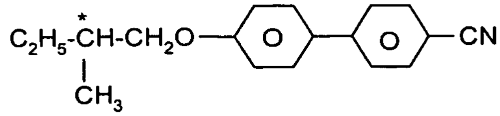
PUQU-n-F



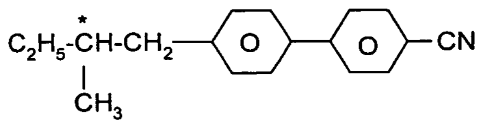
FET-nCl

Table C:

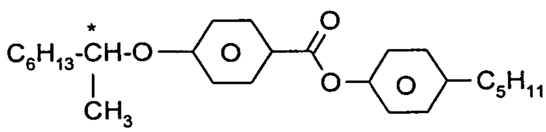
Table C shows possible dopants which are preferably added to the mixtures according to the invention.



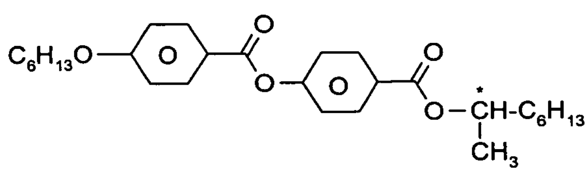
C 15



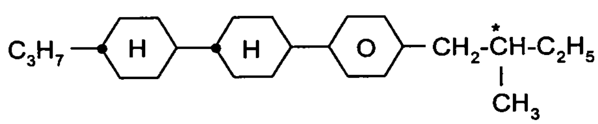
CB 15



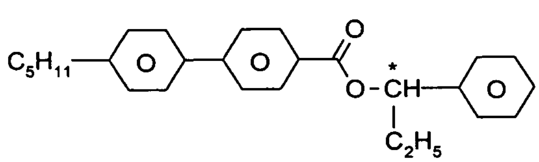
CM 21



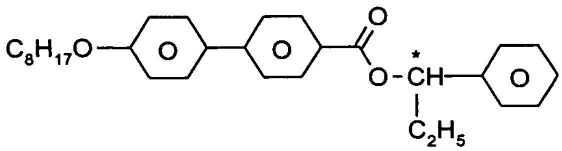
R/S-811



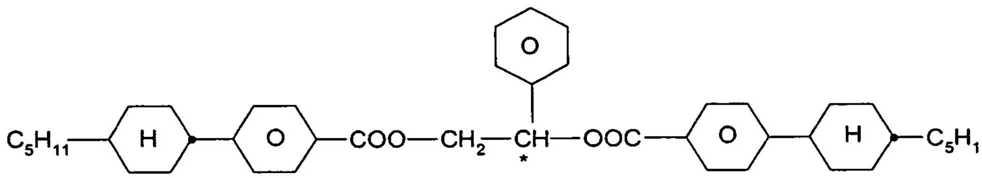
CM 44



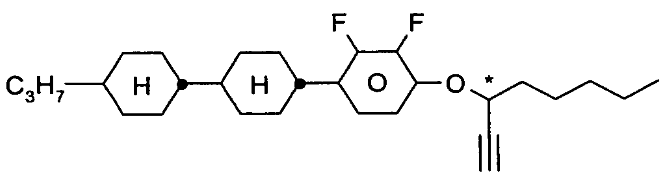
CM 45



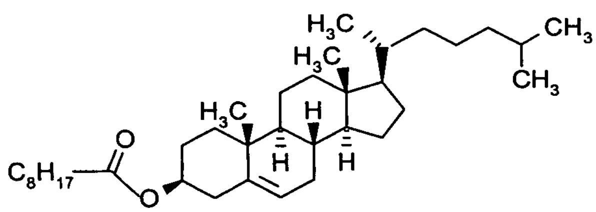
CM 47



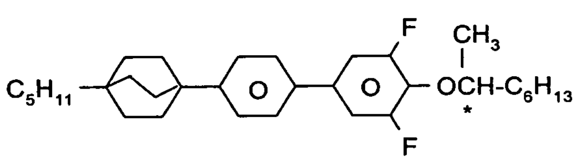
R/S-1011



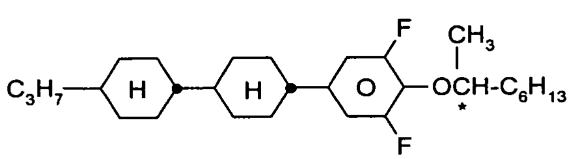
R/S-3011



CN



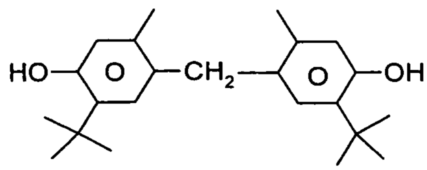
R/S-4011

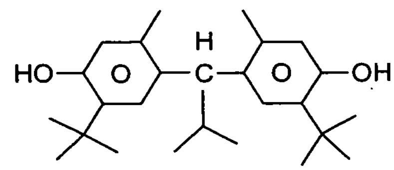


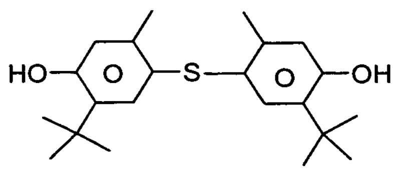
R/S-2011

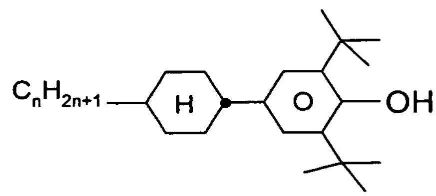
Table D:

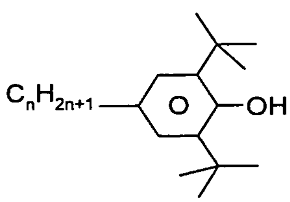
Stabilisers which can be added, for example, to the mixtures according to the invention are mentioned below.

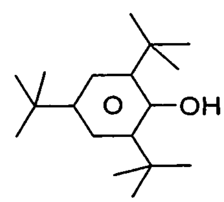


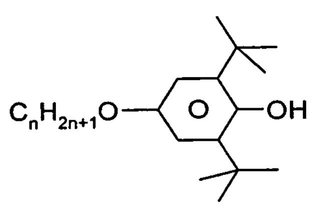


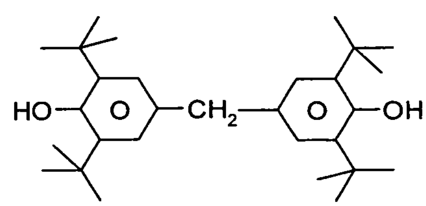


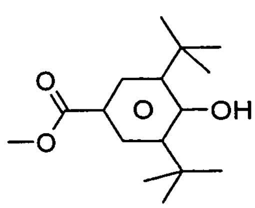


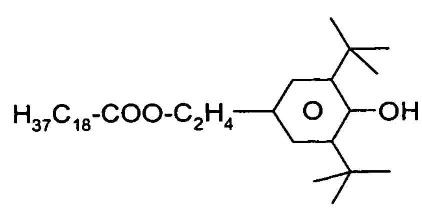


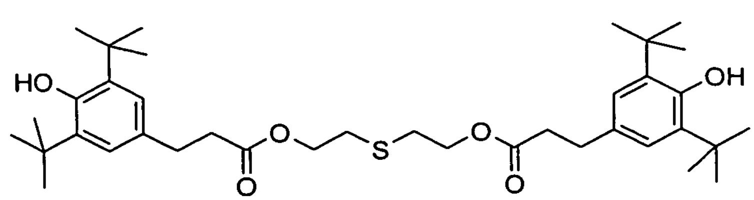


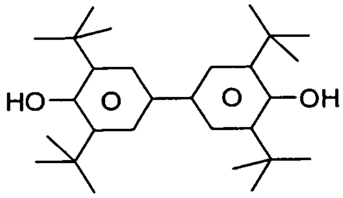


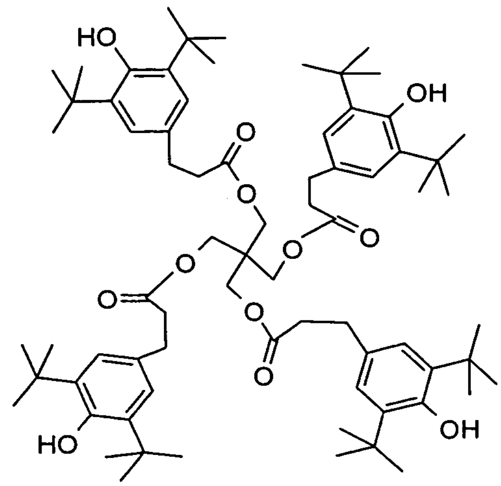


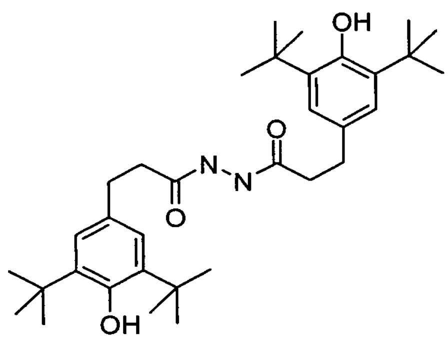


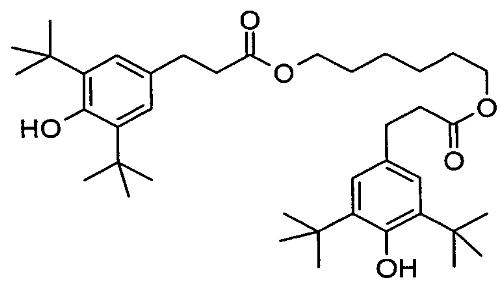


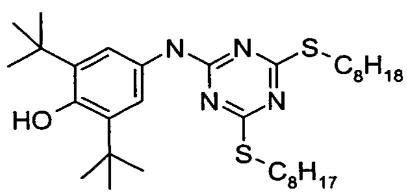


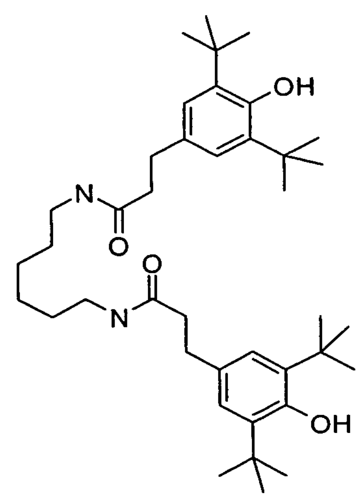


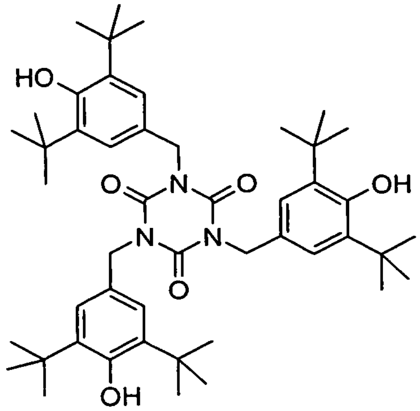


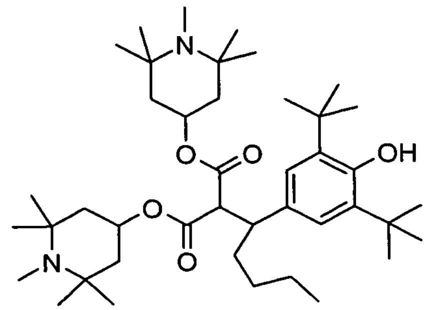


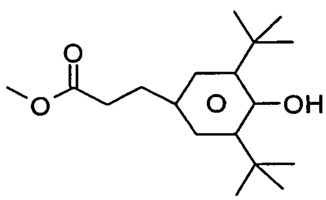


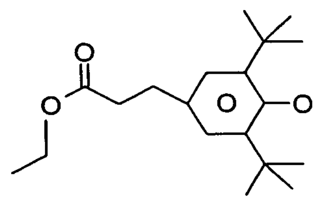


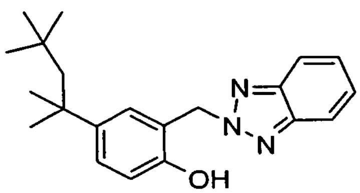


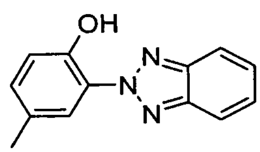


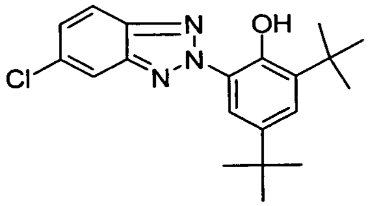


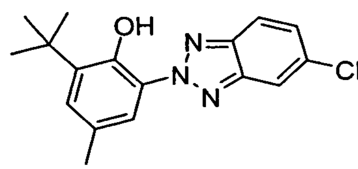


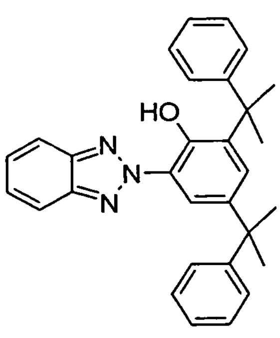


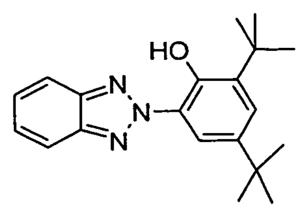


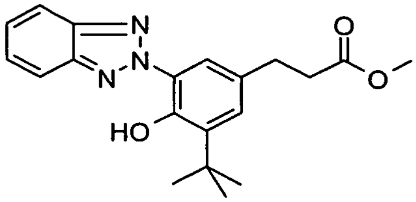


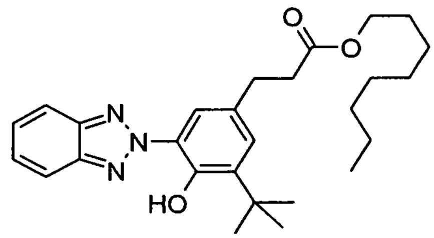


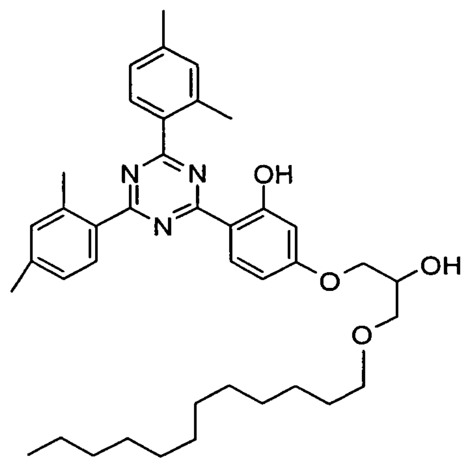


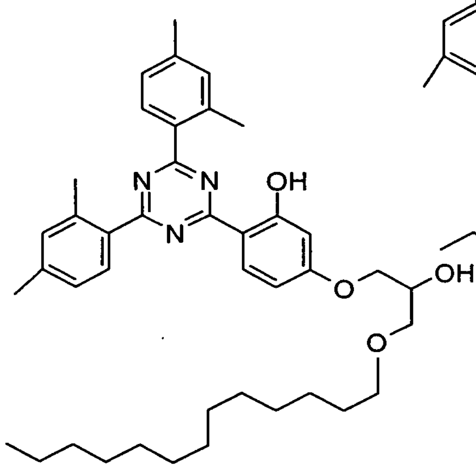


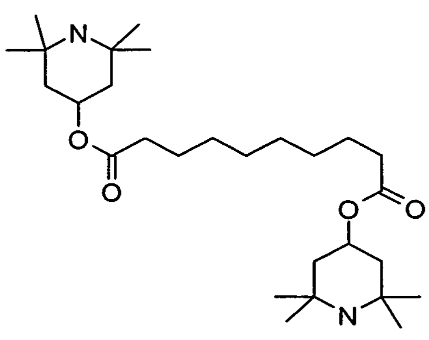


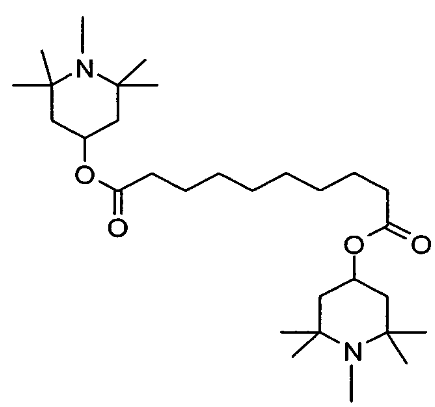












Besides one or more compounds of the formula I, particularly preferred mixtures comprise one, two, three, four, five or more compounds from Table B.

The following examples are intended to explain the invention without restricting it. Above and below, percentages are per cent by weight. All temperatures are indicated in degrees Celsius. cl.p. denotes clearing point.

Δn denotes the optical anisotropy (589 nm, 20°C). The optical data were measured at 20°C, unless expressly stated otherwise. $\Delta\varepsilon$ denotes the dielectric anisotropy ($\Delta\varepsilon = \varepsilon_{\parallel} - \varepsilon_{\perp}$, where $\varepsilon_{\parallel}$ denotes the dielectric constant parallel to the longitudinal molecular axes and $\varepsilon_{\perp}$ denotes the dielectric constant perpendicular thereto). The electro-optical data were measured in a TN cell at the 1st minimum (i.e. at a $d \cdot \Delta n$ value of 0.5 μm) at 20°C, unless expressly stated otherwise. The rotational viscosity γ_1 (mPa·s) was determined at 20°C.

V_{10} denotes the threshold voltage, i.e. the characteristic voltage at a relative contrast of 10%, V_{50} denotes the characteristic voltage at a relative contrast of 50% and V_{90} denotes the characteristic voltage at a relative contrast of 90%. V_0 denotes the capacitive threshold voltage. The twist is 90°, unless indicated otherwise.

The elastic constants K_1 and K_3 were determined at 20°C. K_3/K_1 is the ratio of the elastic constants K_3 and K_1.

Examples

Example 1

$CCP-2OCF_3$	2.0%	Clearing point [°C]: 80.0
$CCP-3OCF_3$	8.0%	Δn [589 nm, 20°C]: 0.0934
CCZU-3-F	14.0%	Δε [1 kHz, 20°C]: 6.0
CC-3-V1	10.0%	γ_1 [mPa·s, 20°C]: 70
PCH-301	7.0%	V_{10} [V]: 1.64
CCP-V-1	12.0%	V_{50} [V]: 1.99
CCG-V-F	10.0%	V_{90} [V]: 2.48
CC-4-V	18.0%	V_{90}/V_{10}: 1.509
PUQU-2-F	6.0%	
PUQU-3-F	8.0%	
PGP-2-3	5.0%	

Example 2

$CCP-2OCF_3$	4.0%	Clearing point [°C]: 79.0
$CCP-3OCF_3$	8.0%	Δn [589 nm, 20°C]: 0.0960
CCZU-3-F	14.0%	
CC-3-V1	10.0%	
PCH-301	9.0%	
CCP-V-1	16.0%	
CC-4-V	18.0%	
PUQU-1-F	8.0%	
PUQU-2-F	7.0%	
PGP-3-2	6.0%	

Example 3

$CCP-2OCF_3$	2.0%	Clearing point [°C]:	81.5
$CCP-3OCF_3$	8.0%	Δn [589 nm, 20°C]:	0.0940
CCZU-3-F	14.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.2
CC-3-V1	10.0%	γ_1 [mPa·s, 20°C]:	70
PCH-301	6.0%	V_{10} [V]:	1.67
CCP-V-1	13.0%	V_{50} [V]:	2.02
CCG-V-F	10.0%	V_{90} [V]:	2.53
CC-4-V	18.0%	V_{90}/V_{10}:	1.512
PUQU-1-F	8.0%		
PUQU-2-F	6.0%		
PGP-3-2	5.0%		

Example 4

$CCP-3OCF_3$	8.0%	Clearing point [°C]:	82.0
CCZU-3-F	13.0%	Δn [589 nm, 20°C]:	0.0925
CC-3-V1	10.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.1
CCP-V-1	13.0%		
CCG-V-F	10.0%		
CC-4-V	18.0%		
PUQU-1-F	8.0%		
PUQU-2-F	7.0%		
PGP-3-2	5.0%		
CVC-3-V	8.0%		

Example 5

PGU-2-F	2.0%	Clearing point [°C]:	80.5
CCP-2OCF$_3$	7.0%	Δn [589 nm, 20°C]:	0.0942
CCP-3OCF$_3$	7.0%	V_{10} [V]:	1.65
CCZU-3-F	14.0%		
CC-3-V1	10.0%		
PCH-301	3.0%		
CCP-V-1	10.0%		
CCG-V-F	10.0%		
CC-4-V	18.0%		
PUQU-2-F	6.0%		
PUQU-3-F	8.0%		
PGP-2-4	5.0%		

Example 6

PGU-2-F	7.0%	Clearing point [°C]:	79.0
CC-3-V1	10.0%	Δn [589 nm, 20°C]:	0.1036
CCP-V-1	12.0%	Δε [1 kHz, 20°C]:	5.0
CCP-V2-1	3.0%	γ_1 [mPa·s, 20°C]:	67
CCG-V-F	10.0%	V_{10} [V]:	1.78
CCP-2OCF$_3$	4.0%	V_{50} [V]:	2.13
CCP-3OCF$_3$	4.0%	V_{90} [V]:	2.65
CCP-4OCF$_3$	2.0%	V_{90}/V_{10}:	1.490
CCZU-3-F	5.0%		
PCH-301	8.0%		
CC-4-V	18.0%		
PUQU-2-F	4.0%		
PUQU-3-F	5.0%		
PGP-2-4	8.0%		

Example 7

CC-4-V	18.0%	Clearing point [°C]:	79.5
CC-3-V1	11.0%	Δn [589 nm, 20°C]:	0.0939
PCH-302	9.0%	Δε [1 kHz, 20°C]:	6.0
CCP-2OCF$_3$	7.5%	γ_1 [mPa·s, 20°C]:	71
CCP-3OCF$_3$	8.0%	V_{10} [V]:	1.80
CCZU-3-F	13.0%	V_{50} [V]:	2.15
PGP-2-3	5.5%	V_{90} [V]:	2.65
PGP-2-4	5.0%	V_{90}/V_{10}:	1.474
CCQU-2-F	6.0%		
CCQU-3-F	10.0%		
PUQU-2-F	3.0%		
PUQU-3-F	4.0%		

Example 8

CCP-2OCF$_3$	4.0%	Clearing point [°C]:	79.0
CCP-3OCF$_3$	4.0%	Δn [589 nm, 20°C]:	0.0927
CCP-4OCF$_3$	4.0%	Δε [1 kHz, 20°C]:	5.1
CCZU-3-F	9.0%	γ_1 [mPa·s, 20°C]:	65
CC-3-V1	10.0%	V_{10} [V]:	1.76
PCH-301	9.0%	V_{50} [V]:	2.13
CCP-V-1	14.0%	V_{90} [V]:	2.66
CCG-V-F	10.0%	V_{90}/V_{10}:	1.513
CC-4-V	18.0%		
PUQU-2-F	6.0%		
PUQU-3-F	7.0%		
PGP-2-3	5.0%		

Example 9

CCP-30CF$_3$	7.0%	Clearing point [°C]:	79.5
CCZU-2-F	2.0%	Δn [589 nm, 20°C]:	0.0947
CCZU-3-F	14.0%	$\Delta \varepsilon$ [1 kHz, 20°C]:	6.0
PUQU-2-F	6.0%	γ_1 [mPa·s, 20°C]:	68
PUQU-3-F	8.0%	V_{10} [V]:	1.72
CCP-V-1	8.0%		
CC-3-V1	12.0%		
CC-4-V	18.0%		
PCH-301	10.0%		
PGP-2-3	6.0%		
CVCP-1V-OT	9.0%		

Example 10

CCZU-2-F	3.0%	Clearing point [°C]:	79.0
CCZU-3-F	14.0%	Δn [589 nm, 20°C]:	0.0935
PCH-302	10.0%	$\Delta \varepsilon$ [1 kHz, 20°C]:	6.1
CCP-V-1	9.0%	γ_1 [mPa·s, 20°C]:	70
CCG-V-F	5.0%	V_{10} [V]:	1.67
CC-3-V1	12.0%		
CC-4-V	18.0%		
PUQU-2-F	6.0%		
PUQU-3-F	8.0%		
PGP-2-3	5.0%		
CVCP-1V-OT	10.0%		

Example 11

PGU-2-F	4.0%	Clearing point [°C]:	80.5
CC-3-V1	10.0%	γ_1 [mPa·s, 20°C]:	67
CCP-V-1	14.0%	V_{10} [V]:	1.80
CCG-V-F	10.0%		
CCP-20CF$_3$	6.0%		
CCP-30CF$_3$	6.0%		
CCP-40CF$_3$	4.0%		
PCH-301	6.0%		
CC-4-V	18.0%		
PUQU-2-F	6.0%		
PUQU-3-F	8.0%		
PGP-2-3	8.0%		

Example 12

PGU-2-F	6.0%	Clearing point [°C]:	80.0
PGU-3-F	2.0%	Δn [589 nm, 20°C]:	0.1048
CC-3-V1	11.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.7
CCP-V-1	12.0%	γ_1 [mPa·s, 20°C]:	69
CCG-V-F	10.0%	V_{10} [V]:	1.68
CCP-30CF$_3$	6.0%	V_{50} [V]:	2.02
CCZU-3-F	12.0%	V_{90} [V]:	2.48
PCH-301	7.0%	V_{90}/V_{10}:	1.478
CC-4-V	18.0%		
PUQU-2-F	4.0%		
PUQU-3-F	4.0%		
PGP-2-3	8.0%		

Example 13

CCZU-2-F	3.0%	Clearing point [°C]:	80.0
CCZU-3-F	14.0%	Δn [589 nm, 20°C]:	0.0934
PUQU-2-F	6.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.1
PUQU-3-F	8.0%	γ_1 [mPa·s, 20°C]:	69
CCG-V-F	9.0%	V_{10} [V]:	1.67
CCP-V-1	12.0%	V_{50} [V]:	2.01
CC-3-V1	13.0%	V_{90} [V]:	2.52
CC-4-V	18.0%	V_{90}/V_{10}:	1.511
PCH-301	5.0%		
PGP-2-4	6.0%		
CVCP-2V-OT	6.0%		

Example 14

PUQU-2-F	10.0%	Clearing point [°C]:	79.0
PUQU-3-F	10.0%	Δn [589 nm, 20°C]:	0.0943
CCP-V-1	16.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.6
CCP-V2-1	4.0%	γ_1 [mPa·s, 20°C]:	67
CCG-V-F	10.0%	V_{10} [V]:	1.78
CC-3-V1	13.0%	V_{50} [V]:	2.15
CC-4-V	18.0%	V_{90} [V]:	2.71
PCH-301	6.0%	V_{90}/V_{10}:	1.522
PGP-2-4	2.0%		
CVCP-1V-OT	11.0%		

Example 15

CCZU-3-F	6.0%	Clearing point [°C]:	79.0
CCP-V-1	16.0%	Δn [589 nm, 20°C]:	0.0940
CCG-V-F	10.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.8
CC-4-V	18.0%	γ_1 [mPa·s, 20°C]:	65
CC-3-V1	13.0%	V_{10} [V]:	1.71
PCH-301	6.0%	V_{50} [V]:	2.06
PUQU-1-F	9.0%	V_{90} [V]:	2.59
PUQU-2-F	9.0%	V_{90}/V_{10}:	1.519
PGP-2-4	3.0%		
CVCP-1V-OT	10.0%		

Example 16

CCZU-3-F	12.0%	Clearing point [°C]:	79.0
PUQU-2-F	8.0%	Δn [589 nm, 20°C]:	0.0938
PUQU-3-F	9.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.8
CCP-V-1	12.0%	γ_1 [mPa·s, 20°C]:	68
CC-3-V1	12.0%	V_{10} [V]:	1.72
CC-4-V	18.0%	V_{50} [V]:	2.08
PCH-301	11.0%	V_{90} [V]:	2.59
PGP-2-3	4.0%	V_{90}/V_{10}:	1.506
CVCP-1V-OT	10.0%		
CCC-V-V	4.0%		

Example 17

CCZU-3-F	7.0%	Clearing point [°C]:	80.0
CCP-V-1	16.0%	Δn [589 nm, 20°C]:	0.0936
CCG-V-F	10.0%	Δε [1 kHz, 20°C]:	5.9
CC-4-V	18.0%	γ_1 [mPa·s, 20°C]:	67
CC-3-V1	13.0%	V_{10} [V]:	1.71
PCH-301	5.0%	V_{50} [V]:	2.07
PUQU-2-F	9.0%	V_{90} [V]:	2.60
PUQU-3-F	9.0%	V_{90}/V_{10}:	1.518
PGP-2-4	3.0%		
CVCP-1V-OT	10.0%		

Example 18

CCZU-2-F	4.0%	Clearing point [°C]:	80.0
CCZU-3-F	14.0%	Δn [589 nm, 20°C]:	0.0941
CCP-20CF3	4.0%	Δε [1 kHz, 20°C]:	7.4
CCP-30CF3	3.0%	γ_1 [mPa·s, 20°C]:	66
CCP-V-1	14.0%	V_{10} [V]:	1.55
CCG-V-F	5.0%	V_{50} [V]:	1.87
PUQU-1-F	10.0%	V_{90} [V]:	2.33
PUQU-2-F	8.0%	V_{90}/V_{10}:	1.505
PGP-2-4	5.0%		
CC-3-V1	13.0%		
CC-3-V	20.0%		

Example 19

PGU-1-F	5.0%	Clearing point [°C]:	79.0
PGU-2-F	4.0%	Δn [589 nm, 20°C]:	0.1047
CC-3-V1	12.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.3
CCP-V-1	14.0%	γ_1 [mPa·s, 20°C]:	65
CCG-V-F	5.0%	V_{10} [V]:	1.72
CCP-30CF3	6.0%	V_{50} [V]:	2.07
CCZU-3-F	12.0%	V_{90} [V]:	2.57
PCH-301	9.0%	V_{90}/V_{10}:	1.496
CC-4-V	18.0%		
PUQU-2-F	3.0%		
PUQU-3-F	4.0%		
PGP-2-4	8.0%		

Example 20

CCZU-2-F	4.0%	Clearing point [°C]:	78.0
CCZU-3-F	14.0%	Δn [589 nm, 20°C]:	0.0992
PUQU-1-F	8.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.8
PUQU-2-F	6.0%	γ_1 [mPa·s, 20°C]:	66
CCP-V-1	13.0%	V_{10} [V]:	1.67
CCG-V-F	7.0%	V_{50} [V]:	2.00
CC-3-V1	15.0%	V_{90} [V]:	2.47
CC-4-V	18.0%	V_{90}/V_{10}:	1.480
PCH-301	5.0%		
PGP-2-3	4.0%		
PGP-2-4	6.0%		

Example 21

CCP-20CF3	4.0%	Clearing point [°C]:	76.0
CCP-30CF3	4.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.4
CCZU-3-F	4.0%	γ_1 [mPa·s, 20°C]:	58
PUQU-1-F	8.0%		
PUQU-2-F	8.0%		
CC-3-V1	6.0%		
CVCP-1V-OT	14.0%		
CVCP-2V-OT	4.0%		
PGP-2-4	8.0%		
CC-V-V1	40.0%		

Comparative Example 1

CCP-2F.F.F	9.5%	Clearing point [°C]:	80.0
CCP-3F.F.F	1.5%	Δn [589 nm, 20°C]:	0.0773
CCZU-2-F	3.5%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.0
CCZU-3-F	9.0%	γ_1 [mPa·s, 20°C]:	81
CCP-20CF$_3$	6.0%	V_{10} [V]:	1.60
CCP-30CF$_3$	4.0%	V_{50} [V]:	1.97
CC-5-V	20.0%	V_{90} [V]:	2.45
CC-3-V1	5.0%	V_{90}/V_{10}:	1.526
PCH-301	6.0%		
CGZP-2-OT	9.0%		
CCP-V-1	4.0%		
CCG-V-F	10.5%		
CGU-2-F	5.0%		
CCH-35	3.5%		
CCP-20CF$_3$.F	3.5%		

Example 22

PGP-2-3	6.0%	Clearing point [°C]: 75.0
PGP-2-4	6.0%	Δn [589 nm, 20°C]: 0.1763
PGP-3-3	6.0%	$\Delta\varepsilon$ [1 kHz, 20°C]: 4.5
PCH-301	11.0%	γ_1 [mPa·s, 20°C]: 150
PCH-302	10.0%	V_0 [V]: 1.66
PGIGI-3-F	8.0%	$\gamma_1/(\Delta n)^2$: 4826
GGP-2-F	10.0%	K_1 [pN]: 11.3
GGP-3-F	11.0%	K_3 [pN]: 14.4
GGP-5-F	10.0%	K_3 / K_1 : 1.27
CCP-V-1	8.0%	
CGG-3-F	14.0%	

Example 23

PGP-2-3	6.0%	Clearing point [°C]: 77.0
PGP-2-4	8.0%	Δn [589 nm, 20°C]: 0.1695
PGP-3-3	6.0%	$\Delta\varepsilon$ [1 kHz, 20°C]: 4.4
PCH-301	15.0%	γ_1 [mPa·s, 20°C]: 156
PCH-302	14.0%	V_0 [V]: 1.73
GGP-2-F	9.0%	$\gamma_1/(\Delta n)^2$: 5430
GGP-3-F	9.0%	K_1 [pN]: 11.7
GGP-5-F	9.0%	K_3 [pN]: 14.2
CGG-3-F	18.0%	K_3 / K_1 : 1.21
CBC-33F	3.0%	
CBC-53F	3.0%	

Example 24

PGP-2-3	10.0%	Clearing point [°C]:	79.0
PGP-2-4	10.0%	Δn [589 nm, 20°C]:	0.1780
PGP-3-3	6.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.6
PCH-301	13.0%	γ_1 [mPa·s, 20°C]:	153
PCH-302	12.0%	V_0 [V]:	1.69
GGP-2-F	9.0%	$\gamma_1/(\Delta n)^2$:	4829
GGP-3-F	10.0%	K_1 [pN]:	11.8
GGP-5-F	7.0%	K_3 [pN]:	14.0
CGG-3-F	19.0%	K_3 / K_1 :	1.19
CBC-33F	4.0%		

Example 25

PGP-2-3	11.0%	Clearing point [°C]:	80.5
PGP-2-4	11.0%	Δn [589 nm, 20°C]:	0.1813
PGP-3-2	6.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.6
PCH-301	12.0%	γ_1 [mPa·s, 20°C]:	157
PCH-302	11.0%	V_0 [V]:	1.69
GGP-2-F	9.0%	$\gamma_1/(\Delta n)^2$:	4776
GGP-3-F	10.0%	K_1 [pN]:	11.9
GGP-5-F	7.0%	K_3 [pN]:	13.7
CGG-3-F	19.0%	K_3 / K_1 :	1.16
CBC-33F	4.0%		

Example 26

PGP-2-3	12.0%	Clearing point [°C]:	81.5
PGP-2-4	12.0%	Δn [589 nm, 20°C]:	0.1885
PGP-3-2	9.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.7
PCH-301	11.0%	γ_1 [mPa·s, 20°C]:	157
PCH-302	9.0%	V_0 [V]:	1.70
GGP-2-F	9.0%	$\gamma_1/(\Delta n)^2$:	4419
GGP-3-F	10.0%	K_1 [pN]:	12.3
GGP-5-F	6.0%		
CGG-3-F	20.0%		
CBC-33F	2.0%		

Example 27

PGP-2-3	13.0%	Clearing point [°C]:	80.0
PGP-2-4	14.0%	Δn [589 nm, 20°C]:	0.1931
PGP-3-2	9.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.8
PCH-301	12.0%	γ_1 [mPa·s, 20°C]:	152
PCH-302	6.0%	V_0 [V]:	1.66
GGP-2-F	9.0%	$\gamma_1/(\Delta n)^2$:	4076
GGP-3-F	11.0%	K_1 [pN]:	12.3
GGP-5-F	6.0%	K_3 [pN]:	12.7
CGG-3-F	20.0%	K_3 / K_1 :	1.04

Example 28

PGP-2-3	14.0%	Clearing point [°C]:	80.5
PGP-2-4	15.0%	Δn [589 nm, 20°C]:	0.1939
PGP-3-2	9.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.8
PCH-301	17.0%	γ_1 [mPa·s, 20°C]:	157
GGP-2-F	9.0%	V_0 [V]:	1.66
GGP-3-F	10.0%	$\gamma_1/(\Delta n)^2$:	4176
GGP-5-F	6.0%	K_1 [pN]:	11.8
CGG-3-F	20.0%	K_3 [pN]:	12.5
		K_3 / K_1 :	1.06

Example 29

PGP-2-3	15.0%	Clearing point [°C]:	84.5
PGP-2-4	15.0%	Δn [589 nm, 20°C]:	0.2001
PGP-3-2	9.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.3
PCH-301	13.0%	γ_1 [mPa·s, 20°C]:	172
GGP-2-F	10.0%	V_0 [V]:	1.64
GGP-3-F	10.0%	$\gamma_1/(\Delta n)^2$:	4296
GGP-5-F	7.0%	K_1 [pN]:	12.4
CGG-3-F	21.0%	K_3 [pN]:	12.2
		K_3 / K_1 :	0.98

Example 30

PGP-2-3	15.0%	Clearing point [°C]:	83.0
PGP-2-4	15.0%	Δn [589 nm, 20°C]:	0.2015
PGP-3-2	9.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.0
PCH-301	12.0%	γ_1 [mPa·s, 20°C]:	159
GGP-2-F	9.0%	V_0 [V]:	1.72
GGP-3-F	10.0%	$\gamma_1/(\Delta n)^2$:	3916
GGP-5-F	6.0%	K_1 [pN]:	13.1
CGG-3-F	20.0%	K_3 [pN]:	13.0
PP-1-2V1	4.0%	K_3 / K_1 :	0.99

Example 31

PGP-2-3	16.0%	Clearing point [°C]:	87.5
PGP-2-4	16.0%	Δn [589 nm, 20°C]:	0.2113
PGP-3-2	11.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.8
PCH-301	9.0%	γ_1 [mPa·s, 20°C]:	174
GGP-2-F	9.0%	V_0 [V]:	1.83
GGP-3-F	10.0%	$\gamma_1/(\Delta n)^2$:	3897
GGP-5-F	6.0%	K_1 [pN]:	14.5
CGG-3-F	18.0%	K_3 [pN]:	13.6
PP-1-2V1	5.0%	K_3 / K_1 :	0.94

Comparative Example 2

FET-2Cl	15.0%	Clearing point [°C]:	80.3
FET-3Cl	6.0%	Δn [589 nm, 20°C]:	0.2106
FET-5Cl	19.0%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.5
PGIGI-3-Cl	10.0%	γ_1 [mPa·s, 20°C]:	299
PGIGI-5-Cl	13.0%	V_0 [V]:	1.76
PCH-301	10.0%	$\gamma_1/(\Delta n)^2$:	6741
GGP-5-Cl	16.0%	K_1 [pN]:	14.4
BCH-3F.F	11.0%	K_3 [pN]:	19.6
		K_3 / K_1 :	1.36

Example 32

PGU-1-F	5.00%	Clearing point [°C]:	79.0
PGU-2-F	4.00%	Δn [589 nm, 20°C]:	0.1047
CC-3-V1	12.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.3
CCP-V-1	14.00%	γ_1 [mPa·s, 20°C]:	64
CCG-V-F	5.00%	V_{10} [V]:	1.75
CCP-30CF$_3$	6.00%	V_{50} [V]:	2.11
CCZU-3-F	12.00%	V_{90} [V]:	2.62
PCH-301	9.00%	V_{90}/V_{10}:	1.499
CC-4-V	18.00%		
PUQU-2-F	7.00%		
PGP-2-4	8.00%		

Example 33

CCP-20CF$_3$	2.00%	Clearing point [°C]:	79.0
CCP-30CF$_3$	8.00%	Δn [589 nm, 20°C]:	0.0930
CCZU-3-F	13.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.9
CC-3-V1	10.00%	γ_1 [mPa·s, 20°C]:	67
PCH-301	8.00%	V_{10} [V]:	1.50
CCP-V-1	12.00%	V_{50} [V]:	1.65
CCG-V-F	10.00%	V_{90} [V]:	2.00
CC-4-V	18.00%	V_{90}/V_{10}:	1.511
PUQU-1-F	8.00%	K_1 [pN]:	11.8
PUQU-2-F	6.00%	K_3 [pN]:	13.5
PGP-2-3	5.00%	K_3 / K_1 :	1.15

Example 34

PGU-1-F	3.00%	Clearing point [°C]:	81.0
PGU-2-F	5.00%	Δn [589 nm, 20°C]:	0.1044
CC-3-V1	11.00%	Δε [1 kHz, 20°C]:	5.5
CCP-V-1	14.00%	γ_1 [mPa·s, 20°C]:	65
CCG-V-F	8.00%	V_{10} [V]:	1.70
CCP-30CF$_3$	6.00%	V_{50} [V]:	2.06
CCZU-3-F	12.00%	V_{90} [V]:	2.55
PCH-301	7.00%	V_{90}/V_{10}:	1.500
CC-4-V	18.00%		
PUQU-2-F	4.00%		
PUQU-3-F	4.00%		
PGP-2-4	8.00%		

Example 35

CCP-20CF$_3$	4.00%	Clearing point [°C]:	79.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1024
CCZU-3-F	4.00%	Δε [1 kHz, 20°C]:	6.1
PUQU-1-F	9.00%	γ_1 [mPa·s, 20°C]:	75
PUQU-2-F	7.00%	V_{10} [V]:	1.76
CC-3-V1	12.00%	V_{50} [V]:	2.14
CVCP-1V-OT	14.00%	V_{90} [V]:	2.66
CVCP-2V-OT	6.00%	V_{90}/V_{10}:	1.511
PGP-2-3	4.00%		
PGP-2-4	6.00%		
CC-V2-V	30.00%		

Example 36

CC-4-V	18.00%	Clearing point [°C]:	74.5
CCP-1F.F.F	2.50%	Δn [589 nm, 20°C]:	0.0893
CCQU-2-F	14.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	12.8
CCQU-3-F	13.00%	γ_1 [mPa·s, 20°C]:	103
CCQU-5-F	11.00%	V_{10} [V]:	1.10
CCQG-3-F	8.00%	V_{50} [V]:	1.35
CCP-30CF$_3$	3.00%	V_{90} [V]:	1.69
PUQU-1-F	8.00%	V_{90}/V_{10}:	1.539
PUQU-2-F	5.00%		
PUQU-3-F	9.00%		
PGP-2-4	3.00%		
CCGU-3-F	3.50%		
CBC-33	2.00%		

Example 37

CC-4-V	14.00%	Clearing point [°C]:	82.0
CC-3-V1	8.00%	Δn [589 nm, 20°C]:	0.0918
CCQU-2-F	14.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	12.0
CCQU-3-F	12.00%	γ_1 [mPa·s, 20°C]:	106
CCQU-5-F	10.00%	V_{10} [V]:	1.22
CCP-2F.F.F	4.00%	V_{50} [V]:	1.50
CCP-30CF$_3$	8.00%	V_{90} [V]:	1.87
PUQU-1-F	8.00%	V_{90}/V_{10}:	1.535
PUQU-2-F	4.00%		
PUQU-3-F	7.00%		
PGP-2-4	3.00%		
CCGU-3-F	6.00%		
CBC-33	2.00%		

Example 38

CC-4-V	18.00%	Clearing point [°C]:	74.5
CCP-1F.F.F	6.00%	Δn [589 nm, 20°C]:	0.0890
CCQU-2-F	14.00%	Δε [1 kHz, 20°C]:	12.6
CCQU-3-F	13.00%	γ_1 [mPa·s, 20°C]:	107
CCQU-5-F	12.00%	V_{10} [V]:	1.10
CCQG-3-F	8.00%	V_{50} [V]:	1.36
PUQU-1-F	7.00%	V_{90} [V]:	1.71
PUQU-2-F	4.00%	V_{90}/V_{10}:	1.550
PUQU-3-F	7.00%		
PGP-2-3	4.00%		
CCGU-3-F	7.00%		

Example 39

CC-4-V	14.00%	Clearing point [°C]:	81.0
CC-3-V1	8.00%	Δn [589 nm, 20°C]:	0.0911
CCQU-2-F	13.00%	Δε [1 kHz, 20°C]:	11.5
CCQU-3-F	13.00%	γ_1 [mPa·s, 20°C]:	108
CCQU-5-F	10.00%	V_{10} [V]:	1.24
CCP-1F.F.F	5.00%	V_{50} [V]:	1.53
CCQG-3-F	2.00%	V_{90} [V]:	1.91
CCP-30CF$_3$	8.00%	V_{90}/V_{10}:	1.536
PUQU-1-F	7.00%		
PUQU-2-F	3.00%		
PUQU-3-F	6.00%		
PGP-2-3	4.00%		
CCGU-3-F	7.00%		

Example 40

PGU-1-F	8.00%	Clearing point [°C]:	80.0
CC-3-V1	12.00%	Δn [589 nm, 20°C]:	0.1043
CCP-V-1	14.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.4
CCG-V-F	5.00%	V_{10} [V]:	1.77
CCP-30CF$_3$	6.00%	V_{50} [V]:	2.13
CCZU-3-F	13.00%	V_{90} [V]:	2.65
PCH-301	10.00%	V_{90}/V_{10}:	1.494
CC-4-V	17.00%	K_1 [pN]:	12.3
PUQU-2-F	3.00%	K_3 [pN]:	12.9
PUQU-3-F	4.00%	K_3 / K_1 :	1.05
PGP-2-4	8.00%		

Example 41

CC-4-V	14.00%	Clearing point [°C]:	81.0
CC-3-V1	8.00%	Δn [589 nm, 20°C]:	0.0921
CCQU-2-F	13.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	11.4
CCQU-3-F	12.00%	γ_1 [mPa·s, 20°C]:	100
CCQU-5-F	11.00%	V_{10} [V]:	1.25
CCP-1F.F.F	4.00%	V_{50} [V]:	1.53
BCH-3F.F.F	3.00%	V_{90} [V]:	1.90
CCP-30CF$_3$	8.00%	V_{90}/V_{10}:	1.522
PUQU-1-F	9.00%		
PUQU-2-F	7.00%		
PGP-2-3	4.00%		
CCGU-3-F	6.00%		
CBC-33	1.00%		

Example 42

CC-4-V	14.00%	Clearing point [°C]:	76.0
CCQU-2-F	13.00%	Δn [589 nm, 20°C]:	0.0878
CCQU-3-F	13.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	12.5
CCQU-5-F	11.00%	γ_1 [mPa·s, 20°C]:	111
CCP-1F.F.F	8.00%	V_{10} [V]:	1.10
CCQG-3-F	8.00%	V_{50} [V]:	1.36
CCP-20CF$_3$	6.00%	V_{90} [V]:	1.69
PUQU-2-F	7.00%	V_{90}/V_{10}:	1.537
PUQU-3-F	10.00%		
PGP-2-3	3.00%		
CCGU-3-F	7.00%		

Example 43

CC-4-V	18.00%	Clearing point [°C]:	74.0
CCP-1F.F.F	7.00%	Δn [589 nm, 20°C]:	0.0887
CCP-2F.F.F	2.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	11.9
CCQU-2-F	14.00%	γ_1 [mPa·s, 20°C]:	103
CCQU-3-F	13.00%	V_{10} [V]:	1.11
CCQU-5-F	11.00%	V_{50} [V]:	1.37
CCQG-3-F	8.00%	V_{90} [V]:	1.72
PUQU-1-F	9.00%	V_{90}/V_{10}:	1.545
PUQU-2-F	7.00%		
PGP-2-3	5.00%		
CCGU-3-F	6.00%		

Example 44

CC-4-V	12.00%	Clearing point [°C]:	81.5
CC-3-V1	7.00%	Δn [589 nm, 20°C]:	0.0938
CCQU-2-F	13.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	11.8
CCQU-3-F	12.00%	γ_1 [mPa·s, 20°C]:	111
CCQU-5-F	11.00%	V_{10} [V]:	1.22
CCP-1F.F.F	5.00%	V_{50} [V]:	1.50
CCP-2F.F.F	4.00%	V_{90} [V]:	1.87
CCP-30CF$_3$	8.00%	V_{90}/V_{10}:	1.533
PUQU-1-F	9.00%		
PUQU-3-F	7.00%		
PGP-2-3	5.00%		
CCGU-3-F	6.00%		
CBC-33	1.00%		

Example 45

CCP-20CF$_3$	2.00%	Clearing point [°C]:	79.5
CCP-30CF$_3$	8.00%	Δn [589 nm, 20°C]:	0.0948
CCZU-3-F	13.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.9
CC-3-V1	10.00%	γ_1 [mPa·s, 20°C]:	64
PCH-301	7.00%	V_{10} [V]:	1.64
CCP-V-1	12.00%	V_{50} [V]:	1.99
CCG-V-F	10.00%	V_{90} [V]:	2.48
CC-4-V	18.00%	V_{90}/V_{10}:	1.513
PUQU-1-F	8.00%	K_1 [pN]:	11.7
PUQU-2-F	6.00%	K_3 [pN]:	13.4
PGP-2-2	6.00%	K_3 / K_1 :	1.15

Example 46

CCP-20CF$_3$	2.00%	Clearing point [°C]:	79.5
CCP-30CF$_3$	8.00%	Δn [589 nm, 20°C]:	0.0939
CCZU-3-F	13.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.0
CC-3-V1	10.00%	γ_1 [mPa·s, 20°C]:	69
PCH-301	7.00%	V_{10} [V]:	1.66
CCP-V-1	12.00%	V_{50} [V]:	2.01
CCG-V-F	10.00%	V_{90} [V]:	2.49
CC-4-V	18.00%	V_{90}/V_{10}:	1.497
PUQU-1-F	8.00%	K_1 [pN]:	11.8
PUQU-2-F	6.00%	K_3 [pN]:	13.3
PGP-2-4	6.00%	K_3 / K_1 :	1.13

Example 47

CCP-20CF$_3$	3.00%	Clearing point [°C]:	78.0
CCP-30CF$_3$	7.00%	Δn [589 nm, 20°C]:	0.0996
CCZU-3-F	13.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.7
CC-3-V1	12.00%	γ_1 [mPa·s, 20°C]:	63
PCH-301	7.00%	V_{10} [V]:	1.68
CCP-V-1	10.00%	V_{50} [V]:	2.02
CCG-V-F	6.00%	V_{90} [V]:	2.49
CC-4-V	18.00%	V_{90}/V_{10}:	1.479
PUQU-1-F	8.00%	K_1 [pN]:	12.1
PUQU-2-F	6.00%	K_3 [pN]:	12.5
PGP-2-4	6.00%	K_3 / K_1 :	1.03
PGP-2-2	4.00%		

Example 48

CCP-3OCF$_3$	4.00%	Clearing point [°C]:	76.5
CCZU-3-F	10.00%	Δn [589 nm, 20°C]:	0.1090
CCP-V-1	11.00%	$\Delta \varepsilon$ [1 kHz, 20°C]:	6.3
CCG-V-F	8.00%	γ_1 [mPa·s, 20°C]:	66
CC-4-V	18.00%	V_{10} [V]:	1.65
CC-3-V1	13.00%	V_{50} [V]:	1.96
PCH-301	4.00%	V_{90} [V]:	2.41
PUQU-1-F	8.00%	V_{90}/V_{10}:	1.458
PUQU-2-F	4.00%	K_1 [pN]:	12.3
PUQU-3-F	6.00%	K_3 [pN]:	12.1
PGP-2-3	7.00%	K_3 / K_1 :	0.99
PGP-2-4	7.00%		

Example 49

CCZU-3-F	12.00%	Clearing point [°C]:	80.0
CCP-V-1	8.00%	Δn [589 nm, 20°C]:	0.1011
CCG-V-F	10.00%	$\Delta \varepsilon$ [1 kHz, 20°C]:	6.2
CC-3-V1	13.00%	γ_1 [mPa·s, 20°C]:	67
CC-4-V	18.00%	V_{10} [V]:	1.64
PCH-301	5.00%	V_{50} [V]:	1.97
PUQU-1-F	8.00%	V_{90} [V]:	2.45
PUQU-2-F	4.00%	V_{90}/V_{10}:	1.491
PUQU-3-F	6.00%	K_1 [pN]:	11.9
PGP-2-3	4.00%	K_3 [pN]:	12.6
PGP-2-4	6.00%	K_3 / K_1 :	1.06
CVCC-V-2	3.00%		
CVCC-V-3	3.00%		

Example 50

CCZU-3-F	12.00%	Clearing point [°C]:	77.0
CCP-V-1	10.00%	Δn [589 nm, 20°C]:	0.1092
CCG-V-F	9.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.3
CC-4-V	10.00%	γ_1 [mPa·s, 20°C]:	66
CC-3-V1	13.00%	V_{10} [V]:	1.65
PCH-301	4.00%	V_{50} [V]:	1.97
PUQU-1-F	8.00%	V_{90} [V]:	2.42
PUQU-2-F	4.00%	V_{90}/V_{10}:	1.458
PUQU-3-F	6.00%	K_1 [pN]:	12.8
PGP-2-3	7.00%	K_3 [pN]:	12.5
PGP-2-4	7.00%	K_3 / K_1 :	0.98
CC-3-2V	10.00%		

Example 51

PGP-2-3	14.00%	Clearing point [°C]:	78.5
PGP-2-4	15.00%	Δn [589 nm, 20°C]:	0.1911
PGP-3-2	9.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.5
PCH-301	19.00%	γ_1 [mPa·s, 20°C]:	149
GGP-2-F	10.00%		
GGP-3-F	10.00%		
GGP-5-F	4.00%		
CGG-3-F	19.00%		

Example 52

PGP-2-3	15.00%	Clearing point [°C]:	76.0
PGP-2-4	15.00%	Δn [589 nm, 20°C]:	0.1888
PGP-3-2	9.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.2
PCH-301	19.00%	γ_1 [mPa·s, 20°C]:	149
CGG-3-F	18.00%		
GGG-3-F	8.00%		
GGG-5-F	8.00%		
GGP-3-F	8.00%		

Example 53

CCP-1F.F.F	8.00%	Clearing point [°C]:	76.5
CCP-3F.F.F	5.00%	Δn [589 nm, 20°C]:	0.1045
CCP-20CF$_3$	6.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	8.1
CCP-30CF$_3$	7.00%	γ_1 [mPa·s, 20°C]:	69
PGU-2-F	6.00%	K_1 [pN]:	12.4
PUQU-2-F	9.00%	K_3 [pN]:	12.5
PUQU-3-F	9.00%	K_3 / K_1 :	1.00
CCP-V-1	9.00%		
CCP-V2-1	7.00%		
CC-3-V1	13.00%		
CC-4-V	15.00%		
PGP-2-3	6.00%		

Example 54

CCP-1F.F.F	8.00%	Clearing point [°C]:	74.5
CCP-3F.F.F	10.00%	Δn [589 nm, 20°C]:	0.1046
CCP-20CF$_3$	6.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.9
CCP-30CF$_3$	7.00%	γ_1 [mPa·s, 20°C]:	72
PUQU-2-F	10.00%	K_1 [pN]:	14.9
PUQU-3-F	10.00%	K_3 [pN]:	13.7
CCP-V-1	10.00%	K_3 / K_1 :	0.92
CCP-V2-1	3.00%		
CC-3-V1	12.00%		
CC-5-V	13.00%		
PGP-2-3	5.50%		
PP-1-2V1	5.50%		

Example 55

PGU-1-F	9.00%	Clearing point [°C]:	80.0
CC-3-V1	12.00%	Δn [589 nm, 20°C]:	0.1029
CCP-V-1	14.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.0
CCG-V-F	5.00%	K_1 [pN]:	12.4
CCP-30CF$_3$	6.00%	K_3 [pN]:	13.1
CCZU-3-F	12.00%	K_3 / K_1 :	1.05
PCH-301	9.00%		
CC-4-V	18.00%		
PUQU-2-F	7.00%		
PGP-2-4	8.00%		

Example 56

PGIGI-3-F	10.00%	Clearing point [°C]:	80.0
PP-1-2V1	10.00%	Δn [589 nm, 20°C]:	0.2024
PCH-301	19.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.1
PGP-2-3	14.00%	γ_1 [mPa·s, 20°C]:	178
PGP-2-4	14.00%	K_1 [pN]:	18.6
PGU-2-F	9.00%	K_3 [pN]:	25.1
PGU-3-F	9.00%	K_3 / K_1 :	1.35
PGU-5-F	8.00%		
CBC-33F	4.00%		
CBC-53F	3.00%		

Example 57

CC-4-V	18.00%	Clearing point [°C]:	82.5
CC-3-V1	7.00%	Δn [589 nm, 20°C]:	0.0944
CCP-20CF$_3$	8.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	11.3
BCH-3F.F.F	5.00%	γ_1 [mPa·s, 20°C]:	102
CCZU-3-F	14.00%	V_{10} [V]:	1.22
PUQU-2-F	7.00%	V_{50} [V]:	1.51
PUQU-3-F	10.00%	V_{90} [V]:	1.86
CCQU-2-F	6.00%	V_{90}/V_{10}:	1.531
CCQU-3-F	13.00%		
PGP-2-3	3.00%		
CCGU-3-F	7.00%		
CBC-33	2.00%		

Example 58

CC-4-V	12.00%	Clearing point [°C]:	76.0
CCQU-2-F	13.00%	Δn [589 nm, 20°C]:	0.0889
CCQU-3-F	14.00%	Δε [1 kHz, 20°C]:	11.6
CCQU-5-F	11.00%	γ_1 [mPa·s, 20°C]:	119
CCP-1F.F.F	6.00%	V_{10} [V]:	1.14
CCP-2F.F.F	5.00%	V_{50} [V]:	1.40
CCQG-2-F	7.00%	V_{90} [V]:	1.76
CCP-20CF$_3$	5.00%	V_{90}/V_{10}:	1.540
PUQG-2-F	9.00%		
PUQG-3-F	8.00%		
PGP-2-3	3.00%		
CCGU-3-F	7.00%		

Example 59

CCP-2F.F.F	8.00%	Clearing point [°C]:	73.0
CCP-3F.F.F	5.00%	Δn [589 nm, 20°C]:	0.1099
PGU-1-F	5.00%	Δε [1 kHz, 20°C]:	4.5
PUQU-1-F	6.00%	γ_1 [mPa·s, 20°C]:	61
PUQU-3-F	4.00%	V_{10} [V]:	1.86
CC-3-V1	13.00%	V_{50} [V]:	2.22
CC-4-V	18.00%	V_{90} [V]:	2.74
CCP-V-1	14.00%	V_{90}/V_{10}:	1.474
CCP-V2-1	3.00%	K_1 [pN]:	11.8
PCH-301	10.00%	K_3 [pN]:	11.8
PGP-2-3	6.00%	K_3 / K_1 :	1.00
PGP-2-4	8.00%		

Example 60

$CCP-2OCF_3$	4.00%	Clearing point [°C]:	78.0
$CCP-3OCF_3$	4.00%	Δn [589 nm, 20°C]:	0.0987
CCZU-3-F	12.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.6
CCP-V-1	13.00%	γ_1 [mPa·s, 20°C]:	64
CCP-V2-1	4.00%	V_{10} [V]:	1.74
CC-4-V	18.00%	V_{50} [V]:	2.09
CC-3-V1	13.00%	V_{90} [V]:	2.57
PCH-301	8.00%	V_{90}/V_{10}:	1.477
PUQU-1-F	6.00%	K_1 [pN]:	12.5
PUQU-2-F	4.00%	K_3 [pN]:	12.9
PUQU-3-F	6.00%	K_3 / K_1 :	1.03
PGP-2-2	4.00%		
PGP-2-4	4.00%		

Example 61

$CCP-2OCF_3$	4.00%	Clearing point [°C]:	82.0
$CCP-3OCF_3$	4.00%	Δn [589 nm, 20°C]:	0.1045
CCQU-2-F	5.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.6
CCQU-3-F	12.00%	γ_1 [mPa·s, 20°C]:	76
CCQU-5-F	5.00%	V_{10} [V]:	1.79
CC-3-V1	16.00%	V_{50} [V]:	2.14
CC-4-V	12.00%	V_{90} [V]:	2.64
CVCP-1V-OT	16.00%	V_{90}/V_{10}:	1.479
PGP-2-2V	7.00%	K_1 [pN]:	12.9
PGP-2-4	7.00%	K_3 [pN]:	13.5
GU-1V2-F	12.00%	K_3 / K_1 :	1.05

Example 62

CCP-20CF$_3$	4.00%	Clearing point [°C]:	78.5
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.0990
CCZU-3-F	12.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.6
CCP-V-1	13.00%	γ_1 [mPa·s, 20°C]:	65
CCP-V2-1	4.00%	V_{10} [V]:	1.74
CC-4-V	18.00%	V_{50} [V]:	2.09
CC-3-V1	13.00%	V_{90} [V]:	2.60
PCH-301	8.00%	V_{90}/V_{10}:	1.491
PUQU-1-F	6.00%	K_1 [pN]:	12.5
PUQU-2-F	4.00%	K_3 [pN]:	13.1
PUQU-3-F	6.00%	K_3 / K_1 :	1.05
PGP-2-3	4.00%		
PGP-2-4	4.00%		

Example 63

CCP-20CF$_3$	4.00%	Clearing point [°C]:	81.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.0982
CCZU-3-F	12.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.3
CCP-V-1	16.00%	γ_1 [mPa·s, 20°C]:	67
CCP-V2-1	4.00%	V_{10} [V]:	1.70
CC-4-V	18.00%	V_{50} [V]:	2.04
CC-3-V1	13.00%	V_{90} [V]:	2.52
PCH-301	5.00%	V_{90}/V_{10}:	1.487
PUQU-2-F	8.00%	K_1 [pN]:	12.6
PUQU-3-F	8.00%	K_3 [pN]:	13.7
PGP-2-F	4.00%	K_3 / K_1 :	1.09
PGP-4-F	4.00%		

Example 64

CCQG-2-F	5.00%	Clearing point [°C]:	79.5
CCQG-3-F	6.00%	Δn [589 nm, 20°C]:	0.1034
CCQU-2-F	10.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.0
CCQU-3-F	12.00%	γ_1 [mPa·s, 20°C]:	78
CC-3-V1	16.00%	V_{10} [V]:	1.69
CC-4-V	9.00%	V_{50} [V]:	2.03
CVCP-1V-OT	16.00%	V_{90} [V]:	2.52
PGP-2-3	7.00%	V_{90}/V_{10}:	1.488
PGP-2-4	7.00%	K_1 [pN]:	12.4
GU-1V2-F	12.00%	K_3 [pN]:	12.9
		K_3 / K_1 :	1.04

Example 65

CVCP-1V-OT	12.00%	Clearing point [°C]:	81.5
CCQU-2-F	12.00%	Δn [589 nm, 20°C]:	0.1004
CCQU-3-F	10.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.6
CCP-2F.F.F	11.00%	γ_1 [mPa·s, 20°C]:	82
CCP-3F.F.F	12.00%	V_{10} [V]:	1.91
CC-3-V1	14.00%	V_{50} [V]:	2.29
CC-5-V	10.00%	V_{90} [V]:	2.83
PGP-2-4	6.00%	V_{90}/V_{10}:	1.483
PP-1-2V1	13.00%	K_1 [pN]:	14.2
		K_3 [pN]:	15.0
		K_3 / K_1 :	1.06

Example 66

CCP-20CF$_3$	3.50%	Clearing point [°C]:	79.5
CCP-30CF$_3$	4.50%	Δn [589 nm, 20°C]:	0.0991
CCZU-3-F	12.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.6
CC-3-V1	13.00%	γ_1 [mPa·s, 20°C]:	65
PCH-301	7.00%	V_{10} [V]:	1.73
CCP-V-1	13.00%	V_{50} [V]:	2.08
CCP-V2-1	5.00%	V_{90} [V]:	2.58
CC-4-V	18.00%	V_{90}/V_{10}:	1.491
PUQU-2-F	8.00%	K_1 [pN]:	12.7
PUQU-3-F	8.00%	K_3 [pN]:	13.1
PGP-2-4	8.00%	K_3 / K_1 :	1.03

Example 67

CCZU-3-F	12.00%	Clearing point [°C]:	79.5
CC-3-V1	13.00%	Δn [589 nm, 20°C]:	0.1029
CC-4-V	18.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.8
PCH-301	8.00%	γ_1 [mPa·s, 20°C]:	77
CCP-V-1	14.00%	V_{10} [V]:	1.53
PUQU-2-F	6.00%	V_{50} [V]:	1.84
PUQU-3-F	6.00%	V_{90} [V]:	2.28
CDUQU-2-F	6.00%	V_{90}/V_{10}:	1.490
CDUQU-4-F	6.00%	K_1 [pN]:	12.6
PGP-2-3	6.00%	K_3 [pN]:	12.7
PGP-2-4	5.00%	K_3 / K_1 :	1.00

Example 68

BCH-3F.F.F	9.00%	Clearing point [°C]:	71.5
BCH-5F.F.F	6.00%	Δn [589 nm, 20°C]:	0.1134
PUQU-1-F	7.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	8.4
PUQU-2-F	8.00%	γ_1 [mPa·s, 20°C]:	74
PUQU-3-F	5.00%	V_{10} [V]:	1.40
CC-3-V1	12.00%	V_{50} [V]:	1.69
CC-5-V	10.00%	V_{90} [V]:	2.09
CCP-V-1	14.00%	V_{90}/V_{10}:	1.493
PCH-301	7.00%	K_1 [pN]:	11.7
PGP-2-4	10.00%	K_3 [pN]:	11.4
CCQU-3-F	7.00%	K_3 / K_1 :	0.97
CCQU-5-F	5.00%		

Example 69

CCP-2OCF$_3$	2.00%	Clearing point [°C]:	80.0
CCP-3OCF$_3$	8.00%	Δn [589 nm, 20°C]:	0.0950
CCZU-3-F	13.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.0
CC-3-V1	10.00%	γ_1 [mPa·s, 20°C]:	67
PCH-301	7.00%	V_{10} [V]:	1.67
CCP-V-1	12.00%	V_{50} [V]:	2.03
CCG-V-F	10.00%	V_{90} [V]:	2.56
CC-4-V	18.00%	V_{90}/V_{10}:	1.533
PUQU-1-F	8.00%	K_1 [pN]:	11.8
PUQU-2-F	6.00%	K_3 [pN]:	13.5
PGP-2-3	6.00%	K_3 / K_1 :	1.14

Example 70

$CCP\text{-}2OCF_3$	2.00%	Clearing point [°C]:	79.5
$CCP\text{-}3OCF_3$	8.00%	Δn [589 nm, 20°C]:	0.0946
CCZU-3-F	13.00%	Δε [1 kHz, 20°C]:	5.9
CC-3-V1	10.00%	V_{10} [V]:	1.64
PCH-301	7.00%	V_{50} [V]:	2.00
CCP-V-1	12.00%	V_{90} [V]:	2.53
CCG-V-F	10.00%	V_{90}/V_{10}:	1.543
CC-4-V	18.00%	K_1 [pN]:	11.7
PUQU-1-F	8.00%	K_3 [pN]:	13.4
PUQU-2-F	6.00%	K_3 / K_1 :	1.15
PGP-2-4	6.00%		

Example 71

$CCP\text{-}2OCF_3$	2.00%	Clearing point [°C]:	81.0
$CCP\text{-}3OCF_3$	8.00%	Δn [589 nm, 20°C]:	0.0951
CCZU-3-F	13.00%	Δε [1 kHz, 20°C]:	6.0
CC-3-V1	10.00%	γ_1 [mPa·s, 20°C]:	67
PCH-301	7.00%	V_{10} [V]:	1.67
CCP-V-1	12.00%	V_{50} [V]:	2.03
CCG-V-F	10.00%	V_{90} [V]:	2.56
CC-4-V	18.00%	V_{90}/V_{10}:	1.533
PUQU-1-F	8.00%	K_1 [pN]:	11.8
PUQU-2-F	6.00%	K_3 [pN]:	13.9
PGP-2-2V	6.00%	K_3 / K_1 :	1.18

Example 72

$CCP\text{-}20CF_3$	3.50%	Clearing point [°C]:	82.0
$CCP\text{-}30CF_3$	4.50%	Δn [589 nm, 20°C]:	0.1000
CCZU-3-F	12.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.7
CCP-V-1	13.00%	γ_1 [mPa·s, 20°C]:	66
CCP-V2-1	5.00%	V_{10} [V]:	1.76
CC-4-V	18.00%	V_{50} [V]:	2.11
CC-3-V1	13.00%	V_{90} [V]:	2.62
PCH-301	7.00%	V_{90}/V_{10}:	1.489
PUQU-2-F	8.00%	K_1 [pN]:	12.9
PUQU-3-F	8.00%	K_3 [pN]:	13.8
PGP-2-2V	8.00%	K_3 / K_1 :	1.07

Example 73

$CCP\text{-}20CF_3$	0.00%	Clearing point [°C]:	80.0
$CCP\text{-}30CF_3$	4.00%	Δn [589 nm, 20°C]:	0.0996
CCZU-3-F	12.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.5
CCP-V-1	13.00%	K_1 [pN]:	11.9
CCP-V2-1	5.00%	K_3 [pN]:	13.7
CC-4-V	15.00%	K_3 / K_1 :	1.15
CC-3-V1	13.00%		
PCH-301	6.00%		
PUQU-2-F	8.00%		
PUQU-3-F	8.00%		
PGP-2-F	5.00%		
PGP-4-F	3.00%		
CCG-V-F	8.00%		

Example 74

CCP-20CF$_3$	2.00%	Clearing point [°C]:	79.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.0992
CCZU-3-F	10.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.4
CCP-V-1	13.00%	K_1 [pN]:	11.8
CCP-V2-1	0.00%	K_3 [pN]:	14.0
CC-4-V	15.00%	K_3 / K_1 :	1.19
CC-3-V1	13.00%		
PCH-301	9.00%		
PUQU-2-F	8.00%		
PUQU-3-F	8.00%		
PGP-2-F	5.00%		
PGP-4-F	3.00%		
CVCP-1V-OT	10.00%		

Example 75

CCP-2F.F.F	5.00%	Clearing point [°C]:	75.5
CCP-3F.F.F	11.00%	Δn [589 nm, 20°C]:	0.1086
PUQU-2-F	6.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.9
PUQU-3-F	8.00%	γ_1 [mPa·s, 20°C]:	67
CC-3-V1	12.00%	V_{10} [V]:	1.83
CC-4-V	14.00%	V_{50} [V]:	2.19
CCP-V-1	11.00%	V_{90} [V]:	2.71
CCP-V2-1	8.00%	V_{90}/V_{10}:	1.485
PCH-301	11.00%	K_1 [pN]:	12.0
PGP-2-3	7.00%	K_3 [pN]:	12.4
PGP-2-4	7.00%	K_3 / K_1 :	1.03

Example 76

CCP-20CF$_3$	4.00%	Clearing point [°C]:	75.5
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1076
PGU-2-F	2.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.5
PGU-3-F	4.00%	γ_1 [mPa·s, 20°C]:	61
PUQU-2-F	5.00%	V_{10} [V]:	1.86
PUQU-3-F	6.00%	V_{50} [V]:	2.23
CC-3-V1	12.00%	V_{90} [V]:	2.77
CC-4-V	16.00%	V_{90}/V_{10}:	1.493
CCP-V-1	15.00%	K_1 [pN]:	11.6
CCG-V-F	12.00%	K_3 [pN]:	12.5
PCH-301	10.00%	K_3 / K_1 :	1.08
PGP-2-3	5.00%		
PGP-2-4	5.00%		

Example 77

CCP-30CF$_3$	4.00%	Clearing point [°C]:	79.0
CCZU-2-F	3.00%	Δn [589 nm, 20°C]:	0.1007
CCZU-3-F	14.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.5
CC-3-V1	13.00%	γ_1 [mPa·s, 20°C]:	66
CC-4-V	18.00%	V_{10} [V]:	1.75
PCH-301	8.00%	V_{50} [V]:	2.09
CCP-V-1	16.00%	V_{90} [V]:	2.59
PUQU-2-F	6.00%	V_{90}/V_{10}:	1.477
PUQU-3-F	8.00%	K_1 [pN]:	12.4
PGP-2-3	5.00%	K_3 [pN]:	12.7
PGP-2-4	5.00%	K_3 / K_1 :	1.02

Example 78

CVCP-1V-OT	8.00%	Clearing point [°C]:	79.0
CCZU-2-F	3.00%	Δn [589 nm, 20°C]:	0.1011
CCZU-3-F	14.00%	Δε [1 kHz, 20°C]:	5.7
CC-3-V1	13.00%	γ_1 [mPa·s, 20°C]:	69
CC-4-V	18.00%	V_{10} [V]:	1.69
PCH-301	8.50%	V_{50} [V]:	2.03
CCP-V-1	11.50%	V_{90} [V]:	2.50
PUQU-2-F	6.00%	V_{90}/V_{10}:	1.481
PUQU-3-F	8.00%	K_1 [pN]:	12.0
PGP-2-3	5.00%	K_3 [pN]:	13.0
PGP-2-4	5.00%	K_3 / K_1 :	1.08

Example 79

CCP-20CF$_3$	4.00%	Clearing point [°C]:	75.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1013
PUQU-2-F	7.00%	Δε [1 kHz, 20°C]:	4.5
PUQU-3-F	9.00%	γ_1 [mPa·s, 20°C]:	65
CCP-3F.F.F	5.00%	V_{10} [V]:	1.93
CCP-V-1	11.00%	V_{50} [V]:	2.30
CCP-V2-1	9.00%	V_{90} [V]:	2.85
CC-5-V	15.00%	V_{90}/V_{10}:	1.478
CC-3-V1	13.00%	K_1 [pN]:	12.3
PCH-301	15.00%	K_3 [pN]:	13.6
PGP-2-3	4.00%	K_3 / K_1 :	1.10
PGP-2-4	4.00%		

Example 80

CCP-20CF$_3$	4.00%	Clearing point [°C]:	75.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1071
PGU-2-F	2.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.1
PGU-3-F	4.00%	γ_1 [mPa·s, 20°C]:	59
PUQU-2-F	4.00%	V_{10} [V]:	1.96
PUQU-3-F	6.00%	V_{50} [V]:	2.34
CC-3-V1	13.00%	V_{90} [V]:	2.90
CC-4-V	16.00%	V_{90}/V_{10}:	1.477
CCP-V-1	16.00%	K_1 [pN]:	11.7
CCG-V-F	9.00%	K_3 [pN]:	12.6
PCH-301	12.00%	K_3 / K_1 :	1.08
PGP-2-3	5.00%		
PGP-2-4	5.00%		

Example 81

CCP-1F.F.F	8.00%	Clearing point [°C]:	76.0
CCP-3F.F.F	10.00%	Δn [589 nm, 20°C]:	0.1041
CCP-20CF$_3$	10.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.9
CCP-30CF$_3$	4.00%	γ_1 [mPa·s, 20°C]:	78
PUQU-2-F	10.00%	V_{10} [V]:	1.50
PUQU-3-F	10.00%	V_{50} [V]:	1.83
PCH-301	5.00%	V_{90} [V]:	2.30
CCP-V-1	10.00%	V_{90}/V_{10}:	1.530
CCP-V2-1	8.00%	K_1 [pN]:	12.1
CC-3-V1	12.00%	K_3 [pN]:	13.5
CC-5-V	5.00%	K_3 / K_1 :	1.12
PGP-2-3	4.00%		
PP-1-2V1	4.00%		

Example 82

CCP-20CF$_3$	4.00%	Clearing point [°C]:	80.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1038
PGU-3-F	5.00%	Δε [1 kHz, 20°C]:	6.0
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	69
PUQU-3-F	10.00%	V_{10} [V]:	1.67
CC-3-V1	13.00%	V_{50} [V]:	2.01
CC-4-V	18.00%	V_{90} [V]:	2.51
CCP-V-1	12.00%	V_{90}/V_{10}:	1.503
CCP-V2-1	5.00%	K_1 [pN]:	12.1
CCG-V-F	8.00%	K_3 [pN]:	13.5
PCH-301	6.00%	K_3 / K_1 :	1.11
PGP-2-3	5.00%		
CCGU-3-F	4.00%		

Example 83

CCP-20CF$_3$	4.00%	Clearing point [°C]:	78.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1143
PGU-3-F	3.00%	Δε [1 kHz, 20°C]:	4.9
PUQU-2-F	7.00%	γ_1 [mPa·s, 20°C]:	68
PUQU-3-F	10.00%	V_{10} [V]:	1.91
CC-3-V1	16.00%	V_{50} [V]:	2.27
CC-4-V	10.00%	V_{90} [V]:	2.80
PCH-301	12.00%	V_{90}/V_{10}:	1.466
CCP-V-1	12.00%	K_1 [pN]:	12.9
CCP-V2-1	10.00%	K_3 [pN]:	13.5
PGP-2-3	6.00%	K_3 / K_1 :	1.04
PGP-2-4	6.00%		

Example 84

CCP-20CF$_3$	4.00%	Clearing point [°C]:	77.5
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1147
PUQU-2-F	6.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.0
PUQU-3-F	10.00%	γ_1 [mPa·s, 20°C]:	70
CC-3-V1	14.00%	V_{10} [V]:	1.94
CC-4-V	10.00%	V_{50} [V]:	2.31
PCH-301	10.00%	V_{90} [V]:	2.84
CCP-V-1	10.00%	V_{90}/V_{10}:	1.464
CCP-V2-1	10.00%	K_1 [pN]:	13.6
CCGU-3-F	6.00%	K_3 [pN]:	14.4
PP-1-2V1	10.00%	K_3 / K_1 :	1.06
PGP-2-4	6.00%		

Example 85

CCP-20CF$_3$	4.00%	Clearing point [°C]:	79.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1049
PGU-3-F	5.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.0
PUQU-2-F	8.00%	γ_1 [mPa·s, 20°C]:	68
PUQU-3-F	10.00%	V_{10} [V]:	1.69
CC-3-V1	13.00%	V_{50} [V]:	2.03
CC-4-V	15.00%	V_{90} [V]:	2.53
CCP-V-1	12.00%	V_{90}/V_{10}:	1.497
CCP-V2-1	10.00%	K_1 [pN]:	12.3
CCG-V-F	8.00%	K_3 [pN]:	13.6
PCH-301	6.00%	K_3 / K_1 :	1.10
PGP-2-3	5.00%		

Example 86

GGP-3-CL	9.00%	Clearing point [°C]:	87.5
GGP-5-CL	23.00%	Δn [589 nm, 20°C]:	0.2040
FET-2CL	7.00%	Δε [1 kHz, 20°C]:	6.9
FET-3CL	4.00%	γ_1 [mPa·s, 20°C]:	179
FET-5CL	7.00%		
PP-1-2V1	13.00%		
CCP-V-1	12.00%		
CC-3-V1	8.00%		
BCH-2F.F	6.00%		
PGP-2-3	2.00%		
PGP-2-4	3.00%		
PGU-3-F	6.00%		

Example 87

CCZU-3-F	12.00%	Clearing point [°C]:	81.0
PGU-2-F	3.00%	Δn [589 nm, 20°C]:	0.1043
PGU-3-F	4.00%	Δε [1 kHz, 20°C]:	6.6
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	72
PUQU-3-F	8.00%	V_{10} [V]:	1.60
CC-3-V1	13.00%	V_{50} [V]:	1.94
CC-4-V	15.00%	V_{90} [V]:	2.41
CCP-V-1	12.00%	V_{90}/V_{10}:	1.506
CCP-V2-1	8.00%	K_1 [pN]:	12.2
CCG-V-F	8.00%	K_3 [pN]:	13.5
PCH-301	6.00%	K_3 / K_1 :	1.10
PGP-2-3	5.00%		

Example 88

GGP-3-CL	9.00%	Clearing point [°C]:	87.5
GGP-5-CL	20.00%	Δn [589 nm, 20°C]:	0.2017
FET-2CL	9.00%	Δε [1 kHz, 20°C]:	6.5
FET-3CL	4.00%	γ_1 [mPa·s, 20°C]:	172
FET-5CL	7.00%		
PP-1-2V1	13.00%		
CCP-V-1	14.00%		
CC-3-V1	10.00%		
PGP-2-3	3.00%		
PGP-2-4	3.00%		
PGU-3-F	8.00%		

Example 89

CCQU-2-F	6.00%	Clearing point [°C]:	80.0
CCQU-3-F	7.00%	Δn [589 nm, 20°C]:	0.0975
CCP-20CF$_3$	4.00%	Δε [1 kHz, 20°C]:	6.7
CCP-30CF$_3$	4.00%	γ_1 [mPa·s, 20°C]:	76
CC-3-V1	14.00%	V_{10} [V]:	1.65
CC-5-V	10.00%	V_{50} [V]:	1.99
PCH-301	7.00%	V_{90} [V]:	2.47
CCP-V-1	10.00%	V_{90}/V_{10}:	1.498
CCP-V2-1	7.00%	K_1 [pN]:	12.3
CCG-V-F	8.00%	K_3 [pN]:	14.0
PUQU-2-F	8.00%	K_3 / K_1 :	1.13
PUQU-3-F	10.00%		
PGP-2-4	5.00%		

Example 90

GGP-3-CL	9.00%	Clearing point [°C]:	90.0
GGP-5-CL	20.00%	Δn [589 nm, 20°C]:	0.1989
FET-2CL	7.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.4
FET-3CL	3.00%		
FET-5CL	6.00%		
PP-1-2V1	14.00%		
PGP-2-3	3.00%		
PGP-2-4	3.00%		
PGU-3-F	7.00%		
CCG-V-F	9.00%		
CCGU-3-F	4.00%		
CC-3-V1	7.00%		
CCP-V-1	8.00%		

Example 91

CCP-1F.F.F	6.00%	Clearing point [°C]:	72.0
CCP-3F.F.F	10.00%	Δn [589 nm, 20°C]:	0.1119
CCP-20CF$_3$	4.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.9
CCP-30CF$_3$	4.00%	γ_1 [mPa·s, 20°C]:	76
CCP-40CF$_3$	4.00%	K_1 [pN]:	12.4
CCP-50CF$_3$	4.00%	K_3 [pN]:	12.8
PUQU-2-F	10.00%	K_3 / K_1 :	1.03
PUQU-3-F	10.00%		
CCP-V-1	13.00%		
CC-3-V1	14.00%		
PCH-301	8.00%		
PGP-2-3	6.50%		
PP-1-2V1	6.50%		

Example 92

CCGU-3-F	3.00%	Clearing point [°C]:	75.5
CC-3-V1	18.00%	Δn [589 nm, 20°C]:	0.1133
CC-4-V	8.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.0
PCH-301	15.00%	γ_1 [mPa·s, 20°C]:	73
CCP-V-1	12.00%	V_{10} [V]:	1.85
CCP-V2-1	12.00%	V_{50} [V]:	2.22
PUQU-2-F	10.00%	V_{90} [V]:	2.78
PUQU-3-F	10.00%	V_{90}/V_{10}:	1.504
PGP-2-3	6.00%	K_1 [pN]:	13.5
PGP-2-4	6.00%	K_3 [pN]:	15.5
		K_3 / K_1 :	1.15

Example 93

PGU-2-F	5.00%	Clearing point [°C]:	73.5
PGU-3-F	4.00%	Δn [589 nm, 20°C]:	0.1167
CCQU-3-F	7.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	8.7
PUQU-2-F	9.00%	γ_1 [mPa·s, 20°C]:	76
PUQU-3-F	9.00%	V_{10} [V]:	1.34
CC-3-V1	10.00%	V_{50} [V]:	1.63
CC-5-V	10.00%	V_{90} [V]:	2.02
CCP-V-1	12.00%	V_{90}/V_{10}:	1.507
PCH-301	9.00%	K_1 [pN]:	10.9
PGP-2-3	3.00%	K_3 [pN]:	12.5
PGP-2-4	5.00%	K_3 / K_1 :	1.15
CCGU-3-F	5.00%		
CCG-V-F	12.00%		

Example 94

PGU-2-F	5.00%	Clearing point [°C]:	74.0
PGU-3-F	4.00%	Δn [589 nm, 20°C]:	0.1154
CCQU-3-F	7.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	8.9
PUQU-2-F	8.00%	γ_1 [mPa·s, 20°C]:	76
PUQU-3-F	9.00%	V_{10} [V]:	1.34
CC-3-V1	11.00%	V_{50} [V]:	1.63
CC-5-V	10.00%	V_{90} [V]:	2.02
CCP-V-1	11.00%	V_{90}/V_{10}:	1.507
PCH-301	10.00%	K_1 [pN]:	11.5
PGP-2-3	3.00%	K_3 [pN]:	11.9
PGP-2-4	5.00%	K_3 / K_1 :	1.03
CCGU-3-F	5.00%		
CCG-V-F	7.00%		
CCZU-3-F	5.00%		

Example 95

CCP-20CF$_3$	4.00%	Clearing point [°C]:	75.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1085
PGU-2-F	2.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.4
PGU-3-F	4.00%	γ_1 [mPa·s, 20°C]:	59
PUQU-2-F	5.00%	V_{10} [V]:	1.88
PUQU-3-F	6.00%	V_{50} [V]:	2.26
CC-3-V1	13.00%	V_{90} [V]:	2.81
CC-4-V	16.00%	V_{90}/V_{10}:	1.495
CCP-V-1	16.00%	K_1 [pN]:	11.7
CCG-V-F	8.00%	K_3 [pN]:	12.8
PCH-301	12.00%	K_3 / K_1 :	1.10
PGP-2-3	5.00%		
PGP-2-2V	5.00%		

Example 96

CCP-2OCF$_3$	4.00%	Clearing point [°C]:	80.5
CCP-3OCF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1057
PGU-3-F	5.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.1
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	68
PUQU-3-F	10.00%	V_{10} [V]:	1.69
CC-3-V1	13.00%	V_{50} [V]:	2.04
CC-4-V	18.00%	V_{90} [V]:	2.55
CCP-V-1	12.00%	V_{90}/V_{10}:	1.509
CCP-V2-1	5.00%	K_1 [pN]:	12.1
CCG-V-F	8.00%	K_3 [pN]:	13.6
PCH-301	6.00%	K_3 / K_1 :	1.12
PGP-2-2V	5.00%		
CCGU-3-F	4.00%		

Example 97

CCP-2OCF$_3$	4.00%	Clearing point [°C]:	79.0
CCP-3OCF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1049
PGU-3-F	3.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.5
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	66
PUQU-3-F	10.00%	V_{10} [V]:	1.75
CC-3-V1	13.00%	V_{50} [V]:	2.11
CC-4-V	18.00%	V_{90} [V]:	2.63
CCP-V-1	12.00%	V_{90}/V_{10}:	1.503
CCP-V2-1	5.00%	K_1 [pN]:	12.1
CCG-V-F	8.00%	K_3 [pN]:	13.3
PCH-301	7.00%	K_3 / K_1 :	1.09
PGP-2-3	5.00%		
PGP-2-4	2.00%		
CCGU-3-F	3.00%		

Example 98

CCZU-3-F	12.00%	Clearing point [°C]:	79.0
PGU-3-F	4.00%	Δn [589 nm, 20°C]:	0.0999
PUQU-2-F	6.00%	Δε [1 kHz, 20°C]:	5.9
PUQU-3-F	8.00%	γ_1 [mPa·s, 20°C]:	69
CC-3-V1	13.00%	V_{10} [V]:	1.66
CC-4-V	16.00%	V_{50} [V]:	2.00
CCP-V-1	12.00%	V_{90} [V]:	2.48
CCP-V2-1	8.00%	V_{90}/V_{10}:	1.494
CCG-V-F	8.00%	K_1 [pN]:	12.0
PCH-301	8.00%	K_3 [pN]:	13.6
PGP-2-3	5.00%	K_3 / K_1 :	1.13

Example 99

CCP-20CF$_3$	4.00%	Clearing point [°C]:	79.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.0980
PUQU-2-F	7.00%	Δε [1 kHz, 20°C]:	5.3
PUQU-3-F	10.00%	γ_1 [mPa·s, 20°C]:	66
CC-3-V1	13.00%	V_{10} [V]:	1.79
CC-4-V	18.00%	V_{50} [V]:	2.15
CCP-V-1	12.00%	V_{90} [V]:	2.68
CCP-V2-1	5.00%	V_{90}/V_{10}:	1.497
CCG-V-F	10.00%	K_1 [pN]:	11.8
PCH-301	8.00%	K_3 [pN]:	13.8
PGP-2-3	5.00%	K_3 / K_1 :	1.17
CCGU-3-F	4.00%		

Example 100

CCP-20CF$_3$	4.50%	Clearing point [°C]:	79.5
CCP-30CF$_3$	4.50%	Δn [589 nm, 20°C]:	0.1033
CCZU-3-F	5.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	5.2
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	66
PUQU-3-F	10.00%	V_{10} [V]:	1.76
CC-3-V1	13.00%	V_{50} [V]:	2.12
CC-4-V	15.00%	V_{90} [V]:	2.62
CCP-V-1	12.00%	V_{90}/V_{10}:	1.489
CCP-V2-1	5.00%	K_1 [pN]:	12.3
CCG-V-F	8.00%	K_3 [pN]:	13.4
PCH-301	8.00%	K_3 / K_1 :	1.08
PGP-2-3	5.00%		
PGP-2-4	4.00%		

Example 101

CC-3-V1	10.00%	Clearing point [°C]:	77.5
CC-4-V	14.00%	Δn [589 nm, 20°C]:	0.0934
PGP-2-3	4.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	8.7
PGP-2-4	4.00%	γ_1 [mPa·s, 20°C]:	83
CCG-V-F	10.00%	V_{10} [V]:	1.38
PUQU-2-F	8.00%	V_{50} [V]:	1.68
PUQU-3-F	7.00%	V_{90} [V]:	2.09
CCQU-2-F	7.00%	V_{90}/V_{10}:	1.516
CCQU-3-F	12.00%		
CCQU-5-F	10.00%		
CCP-3F.F.F	3.00%		
CCP-20CF$_3$	5.00%		
CCP-30CF$_3$	6.00%		

Example 102

CCP-2F.F.F	8.00%	Clearing point [°C]:	81.0
CCP-3F.F.F	6.00%	Δn [589 nm, 20°C]:	0.0808
CCQU-2-F	11.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	16.5
CCQU-3-F	12.00%	γ_1 [mPa·s, 20°C]:	164
CCQU-5-F	10.00%	V_{10} [V]:	0.95
ACQU-2-F	8.00%	V_{50} [V]:	1.20
ACQU-3-F	10.00%	V_{90} [V]:	1.50
ACQU-4-F	10.00%	V_{90}/V_{10}:	1.587
AUUQGU-3-F	9.00%		
CC-4-V	12.00%		
PGP-2-4	4.00%		

Example 103

PCH-301	6.00%	Clearing point [°C]:	76.0
CC-4-V	14.00%	Δn [589 nm, 20°C]:	0.0927
CCP-V-1	10.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	8.7
CCG-V-F	13.00%	γ_1 [mPa·s, 20°C]:	90
PUQU-2-F	8.00%	V_{10} [V]:	1.32
PUQU-3-F	7.00%	V_{50} [V]:	1.62
CCQU-3-F	8.00%	V_{90} [V]:	2.02
CCQU-5-F	7.00%	V_{90}/V_{10}:	1.527
ACQU-2-F	6.00%		
ACQU-3-F	6.00%		
CCP-30CF$_3$	6.00%		
CCP-40CF$_3$	4.00%		
PGP-2-4	3.00%		
PGP-2-3	2.00%		

Example 104

CC-4-V	15.00%	Clearing point [°C]:	86.0
CC-3-V1	2.00%	Δn [589 nm, 20°C]:	0.0900
CCQU-2-F	13.00%	Δε [1 kHz, 20°C]:	11.2
CCQU-3-F	13.00%	γ_1 [mPa·s, 20°C]:	109
CCQU-5-F	12.00%	V_{10} [V]:	1.28
CCP-2OCF$_3$	8.00%	V_{50} [V]:	1.58
CCP-3OCF$_3$	8.00%	V_{90} [V]:	1.98
CCP-5OCF$_3$	5.00%	V_{90}/V_{10}:	1.549
PUQU-2-F	7.00%		
PUQU-3-F	9.00%		
PGP-2-3	3.00%		
CCGU-3-F	5.00%		

Example 105

CC-3-V1	11.00%	Clearing point [°C]:	80.0
CC-4-V	14.00%	Δn [589 nm, 20°C]:	0.0938
PGP-2-3	4.00%	Δε [1 kHz, 20°C]:	8.7
PGP-2-4	4.00%	γ_1 [mPa·s, 20°C]:	86
CCG-V-F	9.00%	V_{10} [V]:	1.41
PUQU-2-F	8.00%	V_{50} [V]:	1.72
PUQU-3-F	7.00%	V_{90} [V]:	2.14
CCQU-2-F	7.00%	V_{90}/V_{10}:	1.514
CCQU-3-F	13.00%		
CCQU-5-F	12.00%		
CCP-3OCF$_3$	5.00%		
CCP-4OCF$_3$	6.00%		

Example 106

ECCP-3F.F	7.00%	Clearing point [°C]:	78.5
CCP-20CF$_3$	4.50%	Δn [589 nm, 20°C]:	0.1008
CCP-30CF$_3$	4.50%	Δε [1 kHz, 20°C]:	4.5
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	70
PUQU-3-F	10.00%	V_{10} [V]:	2.00
CC-4-V	10.00%	V_{50} [V]:	2.40
CC-3-V1	14.00%	V_{90} [V]:	3.01
CCP-V-1	15.00%	V_{90}/V_{10}:	1.503
CCP-V2-1	8.00%	K_1 [pN]:	12.6
PCH-301	15.00%	K_3 [pN]:	14.7
PGP-2-3	6.00%	K_3 / K_1 :	1.16

Example 107

CCZU-3-F	13.00%	Clearing point [°C]:	81.5
PGU-2-F	2.00%	Δn [589 nm, 20°C]:	0.1039
PGU-3-F	4.00%	Δε [1 kHz, 20°C]:	6.7
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	73
PUQU-3-F	10.00%	V_{10} [V]:	1.62
CC-3-V1	13.00%	V_{50} [V]:	1.97
CC-4-V	15.00%	V_{90} [V]:	2.45
CCP-V-1	12.00%	V_{90}/V_{10}:	1.512
CCP-V2-1	8.00%	K_1 [pN]:	12.6
CCG-V-F	7.00%	K_3 [pN]:	13.7
PCH-301	5.00%	K_3 / K_1 :	1.09
PGP-2-3	5.00%		

Example 108

CC-4-V	18.00%	Clearing point [°C]:	79.0
CCP-V-1	10.00%	Δn [589 nm, 20°C]:	0.0931
CCG-V-F	14.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	8.9
PUQU-2-F	8.00%	γ_1 [mPa·s, 20°C]:	88
PUQU-3-F	7.00%	V_{10} [V]:	1.33
CCQU-2-F	3.00%	V_{50} [V]:	1.63
CCQU-3-F	5.00%	V_{90} [V]:	2.03
CCQU-5-F	6.00%	V_{90}/V_{10}:	1.532
ACQU-2-F	7.00%		
ACQU-3-F	6.00%		
CCP-30CF$_3$	6.00%		
CCP-40CF$_3$	4.00%		
PGP-2-4	3.00%		
PGP-2-3	3.00%		

Example 109

CCP-20CF$_3$	4.00%	Clearing point [°C]:	77.0
CCP-30CF$_3$	4.00%	Δn [589 nm, 20°C]:	0.1131
PGU-2-F	2.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	4.7
PGU-3-F	4.00%	K_1 [pN]:	12.3
PUQU-2-F	6.00%	K_3 [pN]:	13.3
PUQU-3-F	8.00%	K_3 / K_1 :	1.08
CC-3-V1	14.00%		
CC-4-V	10.00%		
PCH-301	15.00%		
CCP-V-1	14.00%		
CCP-V2-1	9.00%		
PGP-2-3	5.00%		
PGP-2-4	5.00%		

Example 110

PGU-2-F	3.00%	Clearing point [°C]:	79.5
CC-5-V	15.00%	Δn [589 nm, 20°C]:	0.1206
CC-3-V1	11.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.6
PCH-301	11.00%	γ_1 [mPa·s, 20°C]:	80
CCP-V-1	11.00%	V_{10} [V]:	1.60
CCP-V2-1	9.00%	V_{50} [V]:	1.95
GGP-3-CL	5.00%	V_{90} [V]:	2.43
PUQU-2-F	9.00%	V_{90}/V_{10}:	1.519
PUQU-3-F	9.00%	K_1 [pN]:	12.6
PGP-2-3	3.00%	K_3 [pN]:	13.7
PGP-2-4	6.00%	K_3 / K_1 :	1.09
CCGU-3-F	6.00%		
CCQU-2-F	2.00%		

Example 111

CCZU-3-F	14.00%	Clearing point [°C]:	80.0
PGU-2-F	2.00%	Δn [589 nm, 20°C]:	0.1050
PGU-3-F	5.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.6
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	74
PUQU-3-F	10.00%	V_{10} [V]:	1.51
CC-3-V1	13.00%	V_{50} [V]:	1.82
CC-4-V	15.00%	V_{90} [V]:	2.26
CCP-V-1	10.00%	V_{90}/V_{10}:	1.502
CCP-V2-1	8.00%	K_1 [pN]:	12.1
CCG-V-F	8.00%	K_3 [pN]:	13.2
PCH-301	4.00%	K_3 / K_1 :	1.09
PGP-2-3	5.00%		

Example 112

PGU-3-F	2.00%	Clearing point [°C]:	80.5
CCP-2F.F.F	6.00%	Δn [589 nm, 20°C]:	0.0974
CCP-3F.F.F	12.00%	Δε [1 kHz, 20°C]:	7.0
$CCP-20CF_3$	4.00%	γ_1 [mPa·s, 20°C]:	73
$CCP-30CF_3$	4.00%	V_{10} [V]:	1.61
CC-3-V1	16.00%	V_{50} [V]:	1.95
CC-4-V	14.00%	V_{90} [V]:	2.43
PCH-301	2.00%	V_{90}/V_{10}:	1.511
CCP-V-1	8.00%	K_1 [pN]:	12.5
CCP-V2-1	10.00%	K_3 [pN]:	13.8
PUQU-2-F	7.00%	K_3 / K_1 :	1.10
PUQU-3-F	10.00%		
PGP-2-4	5.00%		

Example 113

$CCP-20CF_3$	4.00%	Clearing point [°C]:	79.5
$CCP-30CF_3$	4.00%	Δn [589 nm, 20°C]:	0.1130
PGU-3-F	3.00%	Δε [1 kHz, 20°C]:	5.3
PUQU-2-F	6.00%	γ_1 [mPa·s, 20°C]:	72
PUQU-3-F	10.00%	V_{10} [V]:	1.82
CC-3-V1	15.00%	V_{50} [V]:	2.18
CC-4-V	9.00%	V_{90} [V]:	2.69
PCH-301	15.00%	V_{90}/V_{10}:	1.482
CCP-V-1	11.00%	K_1 [pN]:	12.5
CCP-V2-1	9.00%	K_3 [pN]:	13.7
CCGU-3-F	4.00%	K_3 / K_1 :	1.09
PGP-2-3	5.00%		
PGP-2-4	5.00%		

Example 114

CCQU-2-F	4.00%	Clearing point [°C]:	78.5
CCQU-3-F	9.00%	Δn [589 nm, 20°C]:	0.0970
CCP-20CF$_3$	4.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	6.6
CCP-30CF$_3$	4.00%	γ_1 [mPa·s, 20°C]:	70
CC-3-V1	12.00%	V_{10} [V]:	1.59
CC-4-V	12.00%	V_{50} [V]:	1.94
PCH-301	7.00%	V_{90} [V]:	2.42
CCP-V-1	11.00%	V_{90}/V_{10}:	1.527
CCP-V2-1	6.00%	K_1 [pN]:	11.9
CCG-V-F	8.00%	K_3 [pN]:	13.5
PUQU-2-F	8.00%	K_3 / K_1 :	1.13
PUQU-3-F	10.00%		
PGP-2-3	5.00%		

Example 115

CCQU-2-F	6.00%	Clearing point [°C]:	80.0
CCQU-3-F	10.00%	Δn [589 nm, 20°C]:	0.0981
CCP-20CF$_3$	4.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.1
CCP-30CF$_3$	4.00%	γ_1 [mPa·s, 20°C]:	75
CC-3-V1	12.00%	V_{10} [V]:	1.58
CC-4-V	9.00%	V_{50} [V]:	1.91
PCH-301	7.00%	V_{90} [V]:	2.36
CCP-V-1	11.00%	V_{90}/V_{10}:	1.495
CCP-V2-1	6.00%	K_1 [pN]:	11.9
CCG-V-F	8.00%	K_3 [pN]:	13.7
PUQU-2-F	8.00%	K_3 / K_1 :	1.16
PUQU-3-F	10.00%		
PGP-2-3	5.00%		

Example 116

CCP-1F.F.F	8.00%	Clearing point [°C]:	73.5
CCP-3F.F.F	10.00%	Δn [589 nm, 20°C]:	0.1038
CCP-20CF$_3$	9.00%	Δε [1 kHz, 20°C]:	7.9
CCP-30CF$_3$	5.00%	γ_1 [mPa·s, 20°C]:	76
PUQU-2-F	10.00%	V_{10} [V]:	1.49
PUQU-3-F	10.00%	V_{50} [V]:	1.80
PCH-301	5.00%	V_{90} [V]:	2.23
CCP-V-1	10.00%	V_{90}/V_{10}:	1.502
CCP-V2-1	6.00%	K_1 [pN]:	12.2
CC-3-V1	12.00%	K_3 [pN]:	13.0
CC-5-V	6.00%	K_3 / K_1 :	1.07
PGP-2-3	4.50%		
PP-1-2V1	4.50%		

Example 117

CCP-1F.F.F	9.00%	Clearing point [°C]:	74.5
CCP-3F.F.F	9.00%	Δn [589 nm, 20°C]:	0.1040
CCP-20CF$_3$	9.00%	Δε [1 kHz, 20°C]:	7.9
CCP-30CF$_3$	4.00%	γ_1 [mPa·s, 20°C]:	73
PUQU-2-F	10.00%	V_{10} [V]:	1.50
PUQU-3-F	10.00%	V_{50} [V]:	2.33
CCP-V-1	10.00%	V_{90} [V]:	2.26
CCP-V2-1	5.00%	V_{90}/V_{10}:	1.506
CC-3-V1	13.00%	K_1 [pN]:	12.8
CC-5-V	11.00%	K_3 [pN]:	13.1
PGP-2-3	5.00%	K_3 / K_1 :	1.02
PP-1-2V1	5.00%		

Example 118

CCP-1F.F.F	8.00%	Clearing point [°C]:	74.0
CCP-3F.F.F	10.00%	Δn [589 nm, 20°C]:	0.1055
CCP-2OCF$_3$	9.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.9
CCP-3OCF$_3$	8.00%	γ_1 [mPa·s, 20°C]:	72
PUQU-2-F	10.00%	V_{10} [V]:	1.52
PUQU-3-F	9.00%	V_{50} [V]:	1.84
CCP-V-1	5.00%	V_{90} [V]:	2.27
CCP-V2-1	5.00%	V_{90}/V_{10}:	1.490
CC-3-V1	13.00%	K_1 [pN]:	13.2
CC-5-V	11.00%	K_3 [pN]:	12.9
PGP-2-3	6.00%	K_3 / K_1 :	0.98
PP-1-2V1	6.00%		

Example 119

CCP-1F.F.F	8.00%	Clearing point [°C]:	73.5
CCP-3F.F.F	10.00%	Δn [589 nm, 20°C]:	0.1056
CCP-2OCF$_3$	10.00%	$\Delta\varepsilon$ [1 kHz, 20°C]:	7.8
CCP-3OCF$_3$	10.00%	γ_1 [mPa·s, 20°C]:	72
PUQU-2-F	10.00%	V_{10} [V]:	1.50
PUQU-3-F	8.00%	V_{50} [V]:	1.83
CCP-V-1	4.00%	V_{90} [V]:	2.25
CCP-V2-1	3.00%	V_{90}/V_{10}:	1.497
CC-3-V1	12.00%	K_1 [pN]:	13.4
CC-5-V	12.00%	K_3 [pN]:	12.7
PGP-2-3	6.50%	K_3 / K_1 :	0.95
PP-1-2V1	6.50%		